August

MODERN MECHANIX

& INVENTIONS MAGAZINE

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SEE PAGE 81

he World's Most Dangerous Job

Home Shop Plans—Furniture—Models—Kinks

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29x4.75-20	2.50	0.95	30x6.00-18	3.40	1.15
29x5.00-19	2.85	1.05	31x6.00-19	3.40	1.15
30x5.00-20	2.85	1.05	32x6.00-20	3.45	1.25
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31x4	2.95	0.85	34x4½	3.45	1.15
32x4	2.95	0.85	30x5	3.65	1.35
33x4	2.95	0.85	33x5	3.75	1.45
34x4	3.25	0.85	35x5	3.95	1.55

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Size	Tires	Tubes
30x5 Truck	$4.25	$1.95
34x5 Truck	4.25	2.00
32x6 Truck	7.95	2.75
36x6 Truck	9.95	3.95
34x7 Truck	10.95	3.95
36x8 Truck	12.45	4.25
40x8 Truck	15.95	4.95

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Size	Tires	Tubes
600-20	$3.75	$1.65
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700-20	5.95	2.95
750-20	6.95	3.75
825-20	8.95	4.95
900-20	10.95	5.65
975-20	13.95	6.45

THIS 12 MONTH GUARANTY BOND REALLY PROTECTS YOU

Drive YORK TIRES at high speed over the roughest roads. These tires can really "take it." Thousands of hard drivers vouch for their unusual stamina. Users say, **"York Tires stand more punishment and give more service than other reconstructed tires."** Try a set yourself. See how the original York process of reconstruction gives to tires the stubborn kind of toughness you know you can depend upon. **19 years of success back of every tire we sell.** Then... you have the additional protection of the iron clad York Guaranty Bond ...a 12 month written guarantee of 100% satisfactory service... you to be the sole judge. No "ifs" or "ands." No arguments. Don't wait. While York prices are lowest in history, get your order in and enjoy these supreme values. Send at once while these low prices are still in force.

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NRA

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BOTH HAD THE SAME CHANCE - *BUT*

READ WHY ONLY TOM MADE GOOD

YES, BILL
I'M CONVINCED OF RADIO'S OPPORTUNITIES. I'M GOING TO START TRAINING FOR RADIO NOW!
NO, TOM
NOT ME, IT'S A WASTE OF TIME. SUCCESS IS JUST A MATTER OF LUCK
HERE'S WHAT HAPPENED TO TOM
JUST THINK - I STARTED TRAINING ONLY A FEW MONTHS AGO AND I'M ALREADY MAKING GOOD MONEY IN SPARE TIME
OH TOM! I'M PROUD OF YOU. YOU'VE GONE AHEAD SO FAST IN RADIO
YES! I'VE GOT A GOOD JOB NOW - AND THERE'S A REAL FUTURE FOR US IN RADIO. N.R.I TRAINING CERTAINLY BROUGHT ME SUCCESS.
BUT READ WHAT HAPPENED TO BILL
SAME OLD GRIND -- SAME SKINNY PAY ENVELOPE. I'M JUST WHERE I STARTED FIVE YEARS AGO
GUESS I'M A FAILURE I'LL NEVER GET ANYWHERE -- I'M NOT LUCKY.
YOU'LL ALWAYS BE A FAILURE - BILL UNLESS YOU DO SOMETHING ABOUT IT. WISHING WON'T GET YOU ANYWHERE

I will train you at home

IN YOUR SPARE TIME FOR A GOOD RADIO JOB

Many Radio Experts Make $40, $60, $75 a Week

Why struggle along in a dull, low-pay job? Start training now for the live-wire Radio field. I have helped many men make more money. Hundreds of successful men now in Radio got their start through N. R. I. Training. Serge A. DeSemov, 1516 Library Ave., New York City, wrote: "I am now in the main control room of a large broadcasting chain." Noel W. Ray, 619 Broad St., Gadsden, Ala., wrote: "In 18 months I made about $4,500 in Radio."

Many Make $5, $10, $15 A Week in Spare Time While Learning

Hold your job. I'll not only train you in a few hours of your spare time a week, but the day you enroll I start sending you Extra Money Job Sheets which quickly show you how to do Radio repair jobs common in your neighborhood. I also give you Radio equipment for conducting experiments and making tests that teach you to build and service practically every type of receiving set made. Cleo T. Retter, 30 W. Beechwood Ave., Dayton, Ohio, wrote: "Working only in spare time, I made about $1,500 while taking the Course." G. Bernard Croy, 151 Washington St., Bronson, Mich., wrote: "I average $15 to $20 a week for spare time only."

Mail the coupon now. Get the facts about Radio—the field with a future. N. R. I. Training fits you for jobs in connection with the manufacture, sale, operation and repair of Radio, Loud Speaker and Television apparatus. It fits you to go in business for yourself, service sets, operate on Board Ships, in Broadcasting, Television, Aviation, Police Radio and in many other jobs. My FREE book tells how to learn quickly at home in spare time to be a radio expert. My book has shown hundreds of men and young men how to make more money and win success. It's FREE to any ambitious person over 15 years of age. Investigate. Find out what Radio offers you—what my men are doing and earning. Read what my Employment Department does to help you get into Radio after graduation, about my Money Back Agreement, and the many other N. R. I. features. Mail the coupon in an envelope, or paste it on a 1c post card TODAY.

J. E. SMITH, President
National Radio Institute

MAIL THIS NOW

J. E. SMITH, President, Dept. 5HH,
National Radio Institute, Washington, D. C.

Dear Mr. Smith: Without obligating me, send your book which points out the spare time and full time job opportunities in Radio and your 50-50 method of training men at home in spare time to become Radio Experts. (Please print plainly)

Name ..... Age .....

Address .....

City ..... State .....

Are You STILL in the DEPRESSION??

TIMES are better. Business is out of the rut—well ahead of a year ago. Millions of men have gone back to work. There's more money in lots of pay envelopes. But what good is that to you, if your pay check is still written in depression figures?

You weren't so discontented a year ago. In fact, you considered yourself lucky to have a job. But now—you have begun to wonder and worry why the oncoming tide of prosperity hasn't reached you yet. The situation is getting desperate. Bills continue to pile up. You can't get along forever on a "shoe string" budget. You *must* win back those pay cuts. Other men are doing it—how can you?

Certainly, you can't work any harder than you have been. And it isn't a question of your intelligence, honesty or ambition. Those virtues do not solve today's problem—they are often insufficient to hold down a job, as millions unemployed sadly testify.

But there *is* a way to get back to the prosperity pay check. A way that's probably far easier than you have dreamed. A *plan* that has been "depression-tested."

During the worst period of the depression, this plan was helping thousands of men and women forge ahead. Today, during recovery, these same men and women—their ranks swelled by thousands more—are being picked for top positions. They are escaping years of monotonous, routine service—achieving their dreams while they are young enough to enjoy success in its fullest measure.

Since this plan brings results in bad times as well as good, it obviously works independently of business conditions. As unbelievable as that may sound, remember that success is largely up to the individual. Most men struggle through a depression all their lives. The few who forge ahead ride to success the same business tides that sweep the majority to failure.

The LaSalle Success-Building Plan is made for men like you—men with courage, ambition, persistence, who need expert guidance to make the most of their efforts. But LaSalle supplies even *more* than that. Not only individualized training and coaching to help you meet today's crying needs . . . but also the very steps you need to take to fill the job ahead, and force that pay raise *quickly*. Any synopsis of this plan, which we might include here, could give you only a vague idea of this service. We suggest you mail the coupon for complete details on your own line of work.

Today's Danger

There's a real danger to accepting "depression pay" these days. A danger that lower wages will continue to dog you—for no employer will pay more until he is convinced you are worth more. Some day, some way, you've got to convince him. There's no time to lose. The sooner you begin, the better.

If the LaSalle Plan has fulfilled this aim for thousands, isn't it logical to expect it can do as much for you? This coupon can easily become your passport to better times. Mail it today.

LaSalle Extension University, Dept. 8493-R, Chicago

I would like to know about your Success-Building Plan and service in the business field I have checked.

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- ☐ Traffic Management
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- ☐ C. P. A. Coaching
- ☐ Industrial Management
- ☐ Modern Foremanship
- ☐ Personnel Management
- ☐ Business Correspondence
- ☐ Business English
- ☐ Effective Speaking
- ☐ Office Management
- ☐ Stenotypy

Name.....*Age*.....

Address.....

LaSalle Extension University

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(20 CENTS IN CANADA)

AUGUST
1935

MODERN MECHANIX
& INVENTIONS MAGAZINE

NRA CODE

Volume XIV
Number 4

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BEWARE of a clogged radiator. It overheats the motor . . . saps power . . . leads to costly repairs. It's much better to prevent a clogged radiator than to cure it. But Sani-Flush will do either. Just pour in Sani-Flush. Run the engine. Then drain. (Directions on the can.) Sani-Flush is perfectly safe. Cannot harm aluminum cylinder-heads, nor cooling-system. It is non-caustic. Use Sani-Flush at least twice a year. It costs only a few cents.

Most women keep Sani-Flush in the house to clean toilet bowls. But if you can't find it, buy a can at any grocery, drug, or hardware store—25c and 10c sizes. The Hygienic Products Co., Canton, Ohio.

Sani-Flush KEEPS RADIATORS CLEAN—NON-CAUSTIC

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Made by the makers of So-Lo plastic shoe repair

At 5 and 10c and Hardware Stores

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STUDENTS BUSY AT WORK IN GREAT COYNE SHOPS

Learn RADIO

Send Today for Details of my *"Pay-After-Graduation"* Plan!

I'll train you in 10 weeks, right here in the great Coyne Shops — **not by correspondence** — but on real Radio, Sound and Television equipment. **Mail the coupon below.** If you are short of money I'll send you all details of my finance plan and consider your application. If accepted, you won't have to start paying me back until **five months from the date you start school,** and then you'll have **over a year** to complete your payments.

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I don't care whether you are 16 or 45. It makes no difference to me if you don't know an oscillator from a spark coil. You don't need any previous experience or advanced education to master my Shop Training. Don't let lack of money hold you back from getting all details of my amazing plan.

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Prepare for Jobs Like These

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RADIO SERVICING
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Jobs - Pay - Future

"I got my present job two days after graduation, at shorter hours, and wages increased 60% over my old job," reports Arne Wiklem of Minnesota. "I have my own shop, own a real car and make fine money in the radio business," writes E. Allen of Montana, "All this is possible because I came to Coyne." And I could go on quoting from hundreds of letters of successful Coyne Trained men. What they have done, you should be able to do.

Electric Refrigeration Air Conditioning

Right now I'm including my big new Electric Refrigeration and Air Conditioning course at no extra cost.

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Coyne is your one great chance to get into Radio. This school is 36 years old—Coyne training is tested—proven beyond all doubt—endorsed by many large concerns. You can find out everything absolutely free. Simply mail the coupon and let me send you the big, free Coyne Book with photographs . . . facts . . . jobs . . salaries . . opportunities. Tells you how many earn expenses while training and how we assist our graduates in the field. This does not obligate you. So act at once. Just mail coupon.

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STREET .....

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Send stamps for further details.

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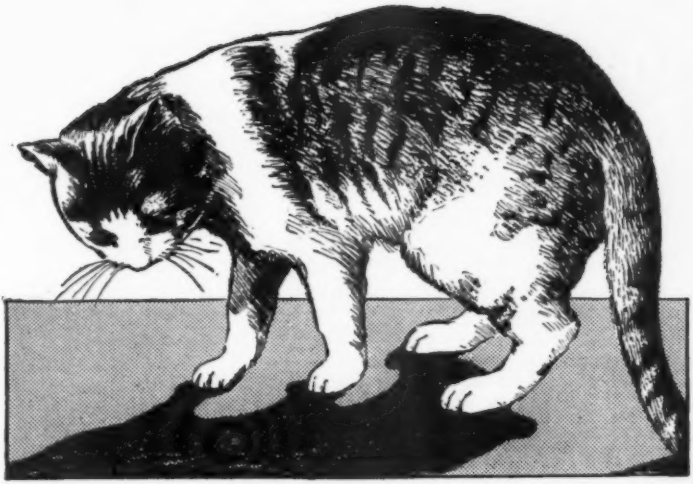

THERE IS A WAY FOR YOU TO MAKE THE MOST OF YOUR ONE LIFE

Broadly speaking, a man gets out of life just what he puts into it. This even applies to the money he makes. Look about you: the man who makes the most money has the most training. He deserves to be ahead of those who merely envy him. Here is the good news: Regardless of his age, any man can acquire modern training today. Thousands of men are doing it by spare-time study of I. C. S. Courses. This is an invitation to you. The coupon may be your first step towards more money!

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☐ Contractor and Builder	☐ Telephone Work ☐ Radio	☐ Steam Engineer	☐ Pharmacy
☐ Structural Draftsman	☐ Mechanical Engineering	☐ Steam Electric Engineer	☐ Coal Mining
☐ Structural Engineer	☐ Mechanical Draftsman	☐ Marine Engineer	☐ Mine Foreman
☐ How to Invent and Patent	☐ Machinist ☐ Toolmaker	☐ R. R. Locomotives	☐ Navigation
☐ Electrical Engineer	☐ Patternmaker	☐ R. R. Section Foreman	☐ Cotton Manufacturing
☐ Electric Lighting	☐ Gas Engines ☐ Diesel Engines	☐ Air Brakes ☐ R. R. Signalmen	☐ Woolen Manufacturing
☐ Welding, Electric and Gas	☐ Aviation Engines	☐ Highway Engineering	☐ Agriculture
☐ Reading Shop Blueprints	☐ Automobile Mechanic	☐ Civil Engineering	☐ Fruit Growing
☐ Boilermaker	☐ Refrigeration	☐ Surveying and Mapping	☐ Poultry Farming

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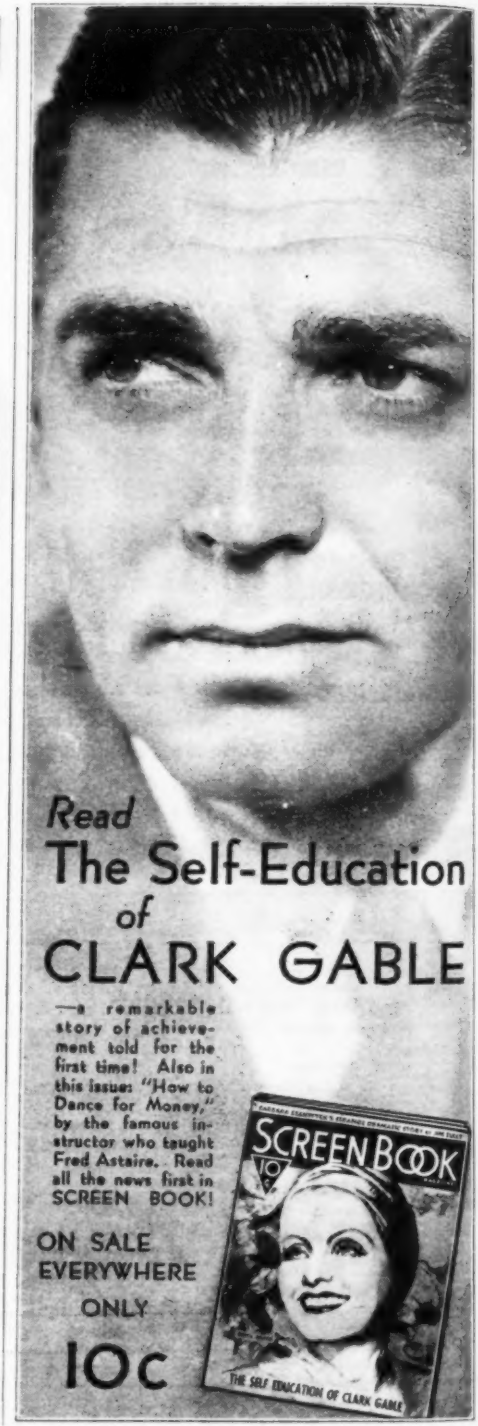

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Soon the Diesel will dominate the power field—throwing out of employment thousands of men operating other types of engines. Now is your chance to get in on the ground floor of this amazing new industry. You young men can grow up with it into important jobs; you older men now handling some other type of power can save your jobs and cash in on your experience.

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Diesel-powered trains have staged a startling comeback for the railroads; but their performance is no more sensational than the daily work of the thousands of Diesels that have replaced steam and gasoline engines in power plants, motor trucks and busses, ships, tractors, dredges, drills, pumps, etc. This replacement is constantly going on all over the country, as the economy and adaptability of the Diesel engine become better known. And every new Diesel installation means more well-paid jobs for Diesel-trained men.

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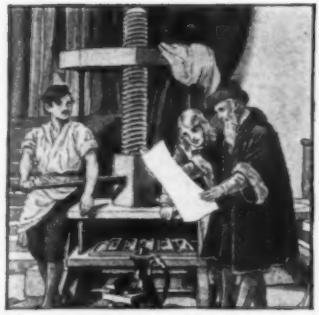

John Gutenberg examining one of the first printed pages.

INTERESTING INVENTIONS

THE GUTENBERG PRESS

Many people have heard of John Gutenberg, and know him as the father of modern printing. But few realize that his most important contribution, the invention of type, came about through chance. Invention frequently happens that way. Goodyear's discovery of the vulcanizing process was an accident. De Forest is said to have stumbled upon the secret that made modern radio receiving sets possible. There are many similar examples.

To get back to Gutenberg, his basic discovery which resulted in type was a lucky break in disguise. In those early days (1400-1468) books were written on parchment in long hand. It was a tedious process, often taking years to make a single copy. Gutenberg conceived the idea of carving the pages of a book on wooden blocks, which once made could print many copies. That in itself was a big idea. But imagine actually carving the pages of a book on wooden blocks. Well, Gutenberg and his partners did it, not once but several times.

But the amount of work was so great that even if the books sold at a good price, the profit was small. Gutenberg's partners, like Columbus' men, finally became disgusted and threatened to quit. Then came the break. One day after Gutenberg had laboriously worked on a page for hours, the block broke in half. It came at a time when nerves were ragged. It was the straw that threatened to break the camel's back. Discouraged, disheartened, Gutenberg sat down and wondered. Suddenly he saw the light. Instead of carving each page of type, why not carve the letters of the alphabet on small individual blocks, then fit the various letters together to make words, fit the words together to make up a page, and then after printing the desired number of copies, use the same letters over again to make up other pages? It was the beginning of modern typesetting. Without that tough break, coming just as failure loomed large, the development of printing as we know it today might have been postponed indefinitely.

Gutenberg's name has gone down in history. Unfortunately there were no patent laws to protect him in the exclusive use of his invention. The news leaked out. Competitors jumped into the field. His partners left him and started in on their own. It was only late in life that he received a measure of the recognition he deserved.

Today, the inventor does not have to look to heaven for his reward. The framers of our constitution took care of that by giving Congress the power to protect the inventor. Gutenberg's inventive genius coupled with our modern American Patent system might have made him very wealthy, as well as famous for all time.

Other men have FREE BOOKS

JOHN GUTENBERG, whose story appears at the left and bottom of this page, struggled for years with a great idea, only to see others step in and capitalize on it after he had found the secret of success. Today an inventor need not be in that position.

If you have an invention—*or an idea for one*—that will save time, save labor, make money or give pleasure, you should consider taking advantage of the protection that the Patent Laws can give you. *The FREE BOOKS shown on the opposite page are crammed full of practical, useful information that a man with an invention should know.* Tell you facts like these: How the Patent Laws protect you and why, if you have an invention, you need a Patent at all; What a Competent Patent Attorney can do for you; What kind of a sketch or model is needed; How to make a disclosure of your idea right away to help establish your claims; How some successful inventors have secured financial assistance, and how they have gone about selling their inventions. Books tell you about interesting inventions that have proved successful, show you 115 different mechanical principles that inventors have used in working out ideas, and give you much other information that every man who has an invention — large or small — may use to his advantage and profit. Even though your invention is still in the rough or crude stages—these books may prove very helpful to you. They will be mailed the same day we hear from you without any charge or the slightest obligation. *They may be the means of saving time, money, and even later disappointment.*

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MOISTURE-PROOFING WOOD

How can linseed oil be used to best advantage as a protective coating for new wood used in boat building?—R. J., Omaha, Nebr.

For new boat lumber the best preservative and primer is a 50-50 mixture of raw linseed oil and turpentine, applied hot. Use three or four coats, applying with a stubby brush. The mixture may be kept hot by placing the can in a pail of boiling water. The turpentine will evaporate, but not before it has carried the oil deeply into the wood and killed rot germs. Additional coats give deeper penetration, filling the pores of the wood with oil. Once the oil has penetrated, it is no more inflammable than ordinary paint.

REDEEMING U. S. STAMPS

Will the Postoffice department redeem embossed stamped envelopes or government postal cards which are soiled or improperly addressed? Can the stamped designs be cut out and used as ordinary stamps?—S. C. L., Dayton, Ohio.

The following quotations from Section 154 of the Postal Laws and Regulations answer the above questions:

1. Stamps removed from embossed stamped envelopes, newspaper wrappers, or postal cards shall *not* be redeemed nor accepted in payment of postage.

2. Uncanceled, unserviceable, and spoiled stamped envelopes and newspaper wrappers in a substantially whole condition, without a printed return card or address thereon, and postal cards without printing thereon, *may be redeemed* from any responsible person in postage stamps or other stamped paper *at the postage value only* of the stamped envelopes and newspaper wrappers and 75 *per cent* of the face value only of the postal cards.

4. Stamped envelopes and newspaper wrappers bearing a printed return card or address, and postal cards with printed matter of the purchaser thereon *may be redeemed* as provided in the preceding paragraph, but only from the person *who purchased them* at a post office or whose printing appears thereon, unless special authorization therefor is obtained from the department.

ELECTRIC CATTLE FENCE

Can you tell me how to make an electric fence consisting of a single wire strung on wood stakes, which will produce enough of a shock to prevent cattle from crossing?—J. W. H., New Cumberland, W. Va.

Either a high voltage, low power transformer or an induction coil might be used, one side of the secondary being connected to the fence wire, the other side to the ground. Since hair is a good insulator, barbed wire should be used for the fence to insure contact with the skin of animals. By rewinding the primary of a Ford T spark coil with smaller size wire and more turns, for 110 volts A.C., a low power transformer which should deliver enough voltage for shocking purposes, yet not be dangerous, can be made. Experiment will show how many miles of single wire fencing can be charged effectively by different sizes of open core transformers or by a large induction coil operating from a battery.

SHORTENING A RIFLE

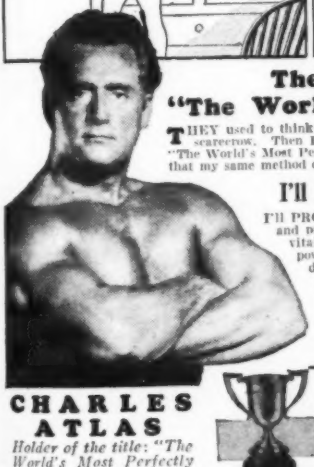
In my country the large grey timber wolves weigh as much as 200 pounds, and are very bold. We travel mainly on skiis, and find it a bit awkward to carry the .3030 rifle, the smallest gun which will stop these wolves. The time lost in withdrawing the rifle from a sling on my back may mean the difference between life and death. Would it be possible to cut the barrel of my .3030 Savage down to around ten inches, and carry the gun in a shoulder holster?—C. W., Alberta, Canada.

Shortening the barrel of your rifle would have little if any effect on the killing power

[*Continued on page* 16]

THE INSULT THAT MADE A MAN OUT OF "MAC"

HEY! QUIT KICKING THAT SAND IN OUR FACES!
LISTEN HERE, MAC. I'D SMASH YOUR FACE···ONLY YOU'RE SO SKINNY YOU MIGHT DRY UP AND BLOW AWAY!
SEE YOU LATER, GIRLIE....
THE BIG BULLY! I'LL GET EVEN SOME DAY
OH DON'T LET IT BOTHER YOU, LITTLE BOY!
IT WAS NICE TO MEET YOU, GRACE. CAN I -ER- COME AROUND SOME EVENING?
NO, I'M AFRAID NOT. I'M PRETTY BUSY. GOOD-DAY!
DARN IT! I'M SICK AND TIRED OF BEING A SCARECROW! CHARLES ATLAS SAYS HE CAN GIVE ME A REAL BODY. ALL RIGHT! I'LL GAMBLE A STAMP AND GET HIS FREE BOOK!
BOY! IT DIDN'T TAKE ATLAS LONG TO DO THIS FOR ME! LOOK AT THOSE MUSCLES BULGE OUT NOW!
THERE'S THAT BIG STIFF AGAIN, SHOWING OFF IN FRONT OF GRACE AND THE CROWD. WELL IT'S MY TURN THIS TIME!
WHAM! - NOW IT'S YOUR TURN TO DRY UP AND BLOW AWAY!
OH MAC! YOU ARE A REAL MAN AFTER ALL!



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36" Between Centers
100 Lb. Weight

$21.75 Less Motor

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Problems Editor Answers Queries

[*Continued from page* 14]

at close range, but would impair its accuracy at the longer distances. In general, any rifle may be shortened with safety. In the United States, however, laws prohibit the use of any rifle or shotgun having a barrel which is shorter than 18 inches.

GENERATOR CONVERSIONS

Have you any information on the winding of automobile generators for different voltages up to 110 volts A.C. or D.C., for welders, and for wind generators?—S. L., Miami, Fla.

Clear instructions for rewinding any of the more common automobile generators either to the original voltage, or to higher voltages, are given in the book "Autopower," which may be secured through the Problems Editor at one dollar postpaid. In addition, this book gives instructions for converting a Dodge generator into an arc welder, for changing a 32-volt lighting plant generator into a 110-volt A.C. generator, for connecting two or more arc welders in parallel, and for making dozens of other valuable conversions.

ETCHING ON GLASS

The hydro-fluoric acid used in commercial glass-etching plants generates fluorine gas, which is fatal when inhaled. Is there a simple etching process which is safe for amateur use?—W. H., Cumberland, Md.

Instructions for preparing a chemical paste which could be used safely to produce a permanent white etched effect on glass, appeared in the March, 1935, issue of MM. This process depends upon the addition of an acid to a fluoride, to produce fluorine, a gas which attacks glass. Such small quantities of the gas are liberated that there is little danger of poisoning.

MAKING LOG RAFTS

What common woods will carry the greatest loads when used in building rafts? Are there any woods in the United States which will not float?—J. R., Lawrence, Kansas.

The lifting power of any wood on water may be obtained by subtracting the weight per cubic foot of that wood from 62.5 pounds, the weight of a cubic foot of water. The best woods for raft-building and their weights when air dried are: balsam poplar—22 lb. per cu. ft., white pine—25 lb. per cu. ft., and northern white cedar—22 lb. per cu. ft. Woods which will sink in water when green are

[*Continued on page* 18]

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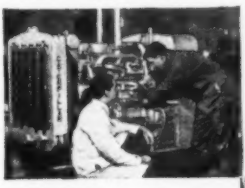

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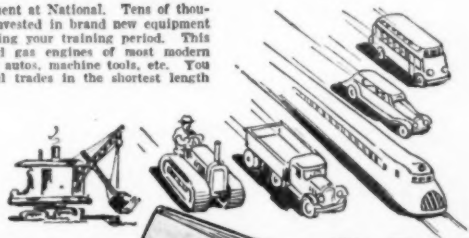

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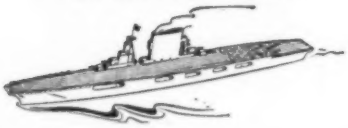

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CHICAGO WHEEL & MFG. CO., 109 S. Aberdeen Street, Chicago, Ill.

Problems Editor Answers Queries

[*Continued from page 16*]

blackwood, blue elderberry, hickory, mangrove, mastic, live oak, ironwood, and swamp white oak.

BALLOON DESIGNING

What is the lifting power of the gas used in large balloons and small pony blimps?—W. C., Denver, Colo.

Hydrogen gas, the most popular for free balloons and for dirigibles, has a lifting force of approximately .075 pounds per cubic foot, as compared to .07 pounds for the same volume of helium. These figures show that 2,650 cu. ft. of hydrogen or 2,850 cu. ft. of helium would be required to lift a 150-pound man with a balloon weighing 50 pounds.

COPYING NEWS CLIPPINGS

Can you tell me how newspaper clippings can be reproduced photographically? — W. A. J., Princeton, W. Va.

Newspaper clippings are generally photographed with a long bellows camera which will take negatives having newsprint in actual size. If a portrait lens is used on an ordinary camera and focusing is accurately carried out, clear negatives can be obtained. These can be enlarged to the desired size. Use a small "stop" on your camera, with longer exposure, to get better detail.

STUNTS WITH MOLTEN IRON

Why are not steel workers burned when they plunge their fingers into molten metal at a temperature of about 2500 degrees Centigrade?—F. C. I., Mahnomen, Minn.

The layer of air and steam which is formed around the fingers when they are plunged into molten iron prevents a burn if immersion is only momentary.

IS STEAM INVISIBLE?

It is true that steam is invisible?—E. J. P., Greeley, Colo.

Pure steam is an invisible gas, and exists in the air at all times in what is known as a super-heated form. Minute particles of water, produced by condensation of portions of the gas, make steam visible, and give what is known as wet steam.

(Editor's Note—Letters sent to this department will not be answered unless accompanied by a stamped, addressed envelope or reply card. Double government reply postcards are convenient for sending in queries. Address Problems Editor, Modern Mechanix Publ. Co., Minneapolis, Minn.)

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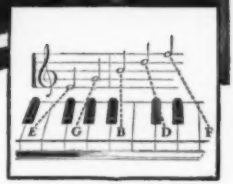

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Name .....

Address .....

City ..... State .....

Attach letter stating age, occupation and name and address of employer and at least one business man as reference.

Random Chips from th

A boy tries to build a bench and ends up with a toboggan slide. Here are a few tips on avoiding little shop troubles and a batch of interesting letters from MM's readers.

WE WATCHED a young fellow completing a bench for his mother's dressing table the other night. It really was a neat looking job, modernistic in design, planed and sanded carefully, everything that a good piece of furniture should be.

He stood it up to see how it was getting along. Imagine his disappointment when he discovered that it sloped down to one side like a toboggan slide. The legs on that side were about an inch shorter than the other.

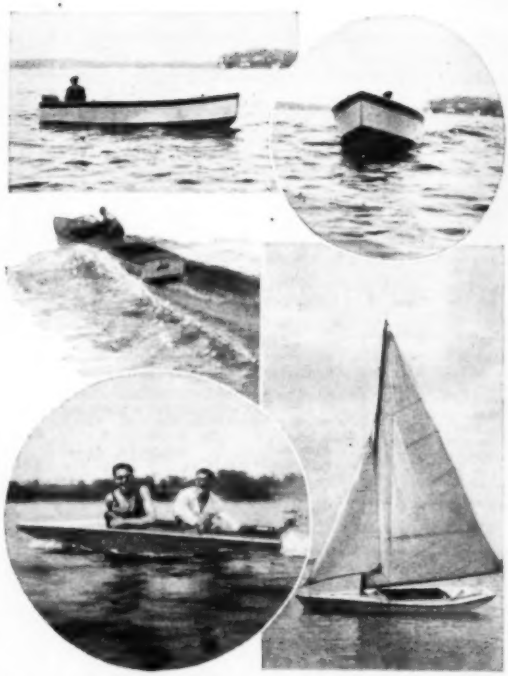
What was the trouble? The boy had blueprints, evidently obtained at school, and had followed the dimensions carefully. But errors are liable to creep into the best planned and checked blueprints.

The young fellow had made the mistake of not drawing full size or scale drawings of his project. That is a good point to keep in mind. From the smallest piece of furniture to the largest of home-built boats always make it a rule to draw your own full-size or scale drawings and you will save yourself a lot of grief.

Your drawings will teach you a good deal about your project before you pick up a hammer or saw. It may look easy, but after making your drawings you may discover that it is really a tough building job. The drawings will show the difficulties you will have to overcome, the kind of joints you will need, the amount of stock necessary, and the hardware that must be bought.

This MM two-tube all-wave radio was constructed by Robert Schoonmaker. Set gets all U. S. districts.

Make your own drawings before you start to build anything and there will be less half-finished jobs around the shop and less muttering of exclamation marks and asterisks (that's the code used in comics) over little errors of $\frac{1}{8}$ or $\frac{1}{16}$-inch in the original blueprints.



Although MM's "How to Build 20 Boats" has been sold out, the MM fleet continues to grow as readers select their designs from our free blueprint catalogue. Two photos at top are of Sergt. Ketcham's *Scram* built for an outboard motor. In center is Andy Pankin's *Scram* with original inboard power. In circle at left is *Midget Hydro* built by Chas. Janovsky of Brooklyn, N. Y. At right is *Sunray* built by Norman J. Rohrback, of Blissfield, Mich. On page 86 is an interesting MM boat building story. A new Rabl boat appears on page 104.

***

Along this same line, here is the experience of one MM fan:

Moose Jaw, Sask.

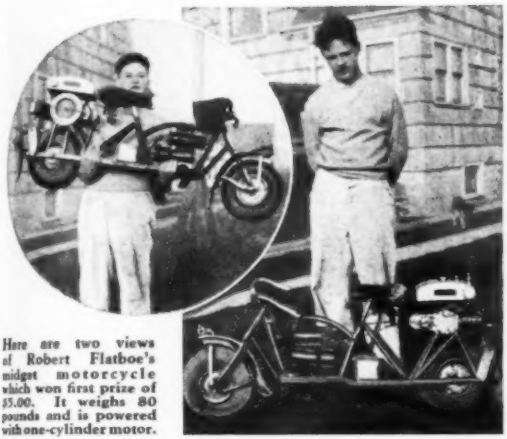
Dear Editor:

I have read all copies of your magazine for the last two years and have sure enjoyed them.

When your book "How to Build 20 Boats" appeared in our town I was a boat fan from the start. In November, 1933, I got started on *Scram* and in June, 1934, I launched one of the snappiest and fastest boats in our province.

I spent two weeks drawing up the plans full size from the book and the boat is built exactly

the Editor's Workbench



Here are two views of Robert Flatboe's midget motorcycle which won first prize of $5.00. It weighs 80 pounds and is powered with one-cylinder motor.

to plans and dimensions. I sure found it pays to stick exactly to scale when building a boat.

I built up my own conversion and reverse gear and it gives perfect satisfaction. I used the Model A Ford motor, not stepped up, and the boat turns up 31.7 miles per hour on the straightaway.

Andy Pankin.

Pankin's boat is one of the group pictured on page 20. Another interesting *Scram* in this group is that of Sergeant C. W. Ketcham of the Minneapolis police headquarters. *Scram* was originally designed for inboard power, but Sergeant Ketcham (and he does catch 'em, police records show) decided he would build *Scram* as an outboard motor boat.

He spent $37 for lumber and fittings, using ⅜" by 1¾" California redwood for planking. She is double-planked with muslin and white lead between, making a doubly water-tight boat, that performs beautifully on Minnesota's lakes.

***

We've had midget cars. Now we've got midget motorcycles. The one shown on this page thumped off with this month's Workbench first prize of $5.00. Here's the "low-down:"

Everett, Wash.

Dear Editor:

Enclosed are pictures of my midget motorcycle. It has 12" wheels and a one-cylinder English *Scootamota* engine, directly driven to the rear wheel by a chain. It weighs eighty pounds and will carry me 25 m.p.h. I weigh 165 pounds. This "Thumper" has lots of power. The entire cost was $13.50 and I did the complete job at home.

Robert Flatboe.

***

A. C. Rott took second prize of $3.00 with his curio cabinet and this letter:

Hollywood, Calif.

Dear Editor:

Enclosed is my version of the curio cabinet described in the October, 1934, issue of MM. The finish is a shiny jet black with silver trim. All carving in relief is in silver. I used a solid front instead of the glass door. The door is lined with green felt on which I intend to hang several medals and small curios.

A. C. Rott.

***

William Beisheim's gas-powered model plane took off with third prize of $2.00. Here's the note he sent with the photo:

Rochester, N. Y.

Dear Editor:

I am enclosing a snapshot of a Stinson Reliant which I have just finished. The ship is powered with a one cylinder gasoline motor, bore 1", stroke ¾". This motor turns at 3,000 r.p.m. The ship has a wing span of 8' 4½". It has air wheels and all movable controls.

William Beisheim.

If you want to build a gasoline powered model

[*Continued on page 22*]

A. C. Rott built this curio cabinet from MM plans and won second prize in the Workbench Contest.

MOULDING A MIGHTY ARM

A SPECIAL COURSE ON ARM BUILDING ONLY 25¢

WHY not get an arm of might with the power and grip to obey your physical desires? I have taken weaklings whose arms were scrawny pieces of skin and bone and in a short time developed them into strong men of powerful proportions with bulging biceps and brawny forearms . . . strong, solid arms of power that are respected by men and admired by women.

This course is specially planned to build every muscle in your arm. It has been scientifically worked out for that purpose. Many of my pupils have developed a pair of triceps shaped like a horse-shoe, and just as strong, and a pair of biceps that show their double head formation. The sinewy cables between the biceps and elbow are deep and thick with wire cable-like ligaments. The forearm bellies with built, the great supinator lifting muscles become a column of power, and their wrists are alive and writhe with cordy sinew.

Send 25c for this course today. Why not start now to build a he-man's arm?

You can't make a mistake. The assurance of the strongest armed man in the world stands behind this course. I give you my secrets of strength illustrated and explained as you like them. Mail your order now while you can still get this course for only 25c.

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Chips From the Editor's Workbench

[*Continued from page 21*]

Powered by a tiny one cylinder gasoline motor, this model of the Stinson Reliant was built by William Beisheim. It has a wing span of eight feet. Beisheim won third prize of $2.00.

plane, look over Donald Evans' little pursuit ship on page 89. We'll venture to guess that it will be one of the most outstanding models of the year.

***

Before we run out of space we'll spare a few lines for MM's DXers. Robert Schoonmaker has this to say about the little set shown on page 20:

St. Paul, Minn.

Dear Editor:

I have read your magazine since 1929 and enjoy it very much. I certainly wish that you would print more how-to-builds, smaller stuff, that requires only a small cash outlay.

I am enclosing a photo of the all-wave Air Scout receiver that I built from plans in your January issue. I got best results on the 20-meter phone band, on which I received all the U. S. districts, but no foreign.

Robert Schoonmaker.

And quoting from a couple of other letters: E. W. Bishop, of Vancouver, B. C., says: "Pleased to report reception on your one-tube short wave set of May, 1934, issue from England, France, Italy, as well as several eastern U. S. and Canadian stations. Have heard South America, Cuba, and Mexico. I added a one-stage amplifier and am using a 201A tube with a resistor." And from J. O. Routh, of Tampa, Fla.: "I built the Hitch Hiker's two-tube portable described in the February issue. I was surprised. I received a great number of stations as far west as Denver. This is the set for the

Clarence D. Farin, of Berkeley, Calif., built this raft with gas tanks.

[*Continued on page 24*]

The New South Bend

9-in. x 3-ft. "WORKSHOP"

PRECISION BENCH LATHE

BACK-GEARED, SCREW CUTTING, METAL WORKING

$75.00 less motor drive

ON EASY TERMS

$6.50 A MONTH

10 Months to Pay

RECOMMENDED FOR

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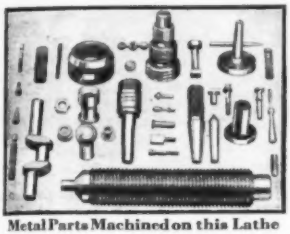
The 9" "Workshop" Lathe turns, faces, bores, cuts screw threads 4 to 40 per inch, does chucking work, and handles all general machining operations on cast iron, steel, other metals, woods, hard rubber, fibre, bakelite, etc. Lathe has automatic longitudinal power feed to carriage, graduated compound rest; micrometer graduations on feed screws, ¾" hole thru spindle, No. 2 Morse Taper Centers, and other features.



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Size of Lathe			Less Countershaft		With Motor Drive	
Swing Over Bed	Length of Bed	Distance Between Centers	Ship'g Wgt. Lbs.	Net Factory Price	Ship'g Wgt. Lbs.	Net Factory Price
9¼"	3'	18"	240	$ 75	300	$ 94
9¼"	3½"	24"	265	87	325	106
9¼"	4'	30"	290	99	350	118
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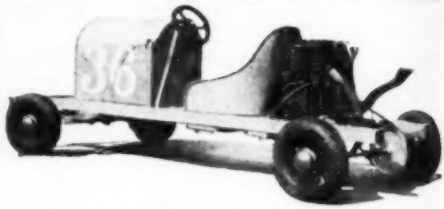
Chips from the Editor's Workbench

[*Continued from page 22*]



This neat little midget car was built by Jere McWethy. It has speed control and does 12 to 15 miles per hour.

man who wants a low-priced useful radio."

***

Signing off with the code signal 73 (regards), J. H. Yerex cheers us along with the following:

Clair, Sask.

Dear Editor:

I certainly enjoy your magazine as it is so easy to read and understand. That is what we average men of today need. It wasn't possible for all of us to obtain a college education. Some of us just picked up our education by listening to others and reading for ourselves.

When I get hold of your magazine it is easy for me to understand its clear text and illustrations. I especially like the illustrations you publish of radios. The pictures are invaluable. That is one of the reasons I am buying your "Radio Builders' Manual."

J. H. Yexex.

***

We're curious to know how many readers have complete or nearly complete files of MM. Sheldon Vaughn, for instance, has lost only one issue since No. 7 of Vol. I.

Medical Lake, Wash.

Dear Editor:

There is little need of my telling you how well I like MM when I tell you that I have the

Chips from the Editor's Workbench

first issue that ever came into our town. That issue was Vol. I No. 7 of December, 1928, and I have every issue since then except one. This issue is Vol. III No. 4 of February, 1930, having loaned this copy out to a friend who lost it. I have never loaned a copy since. When any of the fellows want to see a copy or look for some particular thing they come and do so, but they can't take them out of the house.

Sheldon A. Vaughn.

Vaughn has the right slant on loaning copies. There is such a demand for back copies that they run out of stock within a few months and those readers who are trying to keep a complete file may have difficulty in finding missing issues. "How to Build 20 Boats," as an example, has been completely sold out. If you have a copy, better put a chain and lock on it.

***

And here's inside information on a neat midget car from Jere McWethy:

Aurora, Ill.

Dear Editor:

I am enclosing snapshots of my latest midget racer. The tread is 28 inches and the wheel base is 54 inches. I have used my Briggs and Stratton motor which is connected to the rear axle by a ⅜ inch V belt and has an idler pulley arrangement which is attached to a lever with a rachet.

The wheels, steering gear, front axle, and the tires were taken from a little car. For the hood ends and seat base clear white pine was used with pieces of galvanized iron shaped around them and nailed.

Jere McWethy.

Now that summer is here, winter is just around the corner. Search around for those photos you took last year of your ice boat or ice sled. We'll be needing them soon in the Workbench.

May Problems Contest Winners

WINNERS in the May Problems Contest are: First prize, $10—Edward J. Urban, Maspeth, L. I., N. Y. Second prize, $5—Kenneth Lemke, Clintonville, Wis. Third prizes, $1 each—A. G. Bonilla, Santurce, Puerto Rico; Roy Van Lieu, Sylvester, Texas; Paul Salisbury, Ft. Lewis, Wash.; Stanley Ferguson, Borden, Sask., Canada; Harry Williams, Pittsburgh, Pa.; Israel Keyfitz, Montreal, Canada; Edward Witkowski, Keyport, N. J.; Juan de la Cruz Gutierrez, Santurce, Puerto Rico; Dwight S. Young, Oswego, Ill.; Gilbert Kahlert, Ft. Worth, Texas.

IS THIS THE WAY YOU FEEL ABOUT YOUR JOB?

YOU will never catch any fish while sleeping — and you will never make any more money just going through the motions of your job! You've got to be wide-awake these days. The slightest nibble may be your biggest opportunity. Be alert to it and trained to take advantage of it. You need training to get opportunities! All over the world men have realized this simple truth and are acquiring training through spare-time study of I. C. S. Courses. Their example—and this coupon—suggests a definite course of self-service to you.

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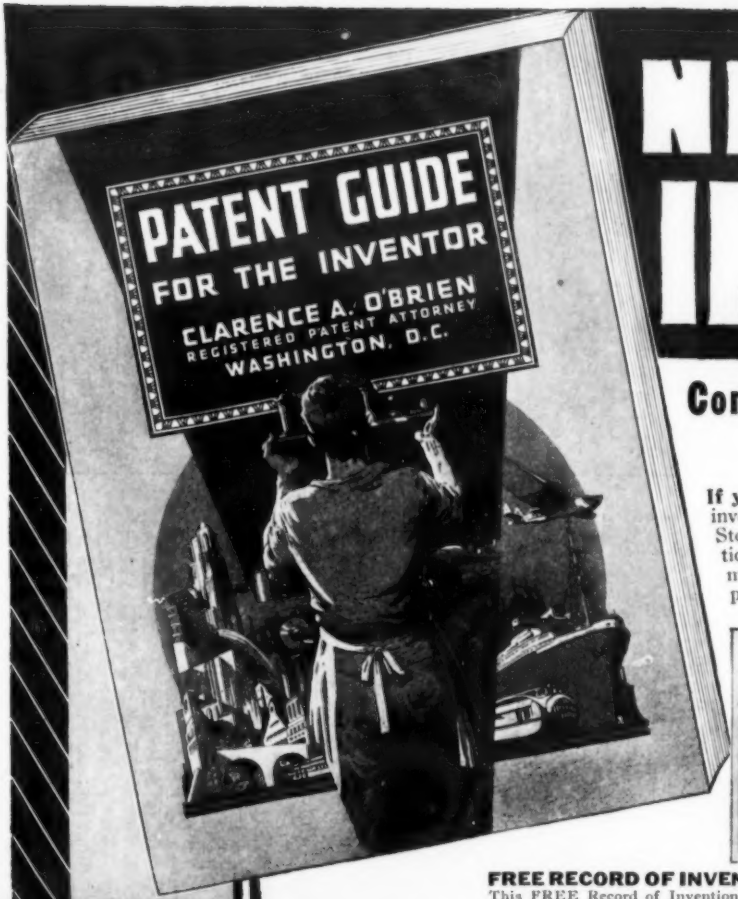

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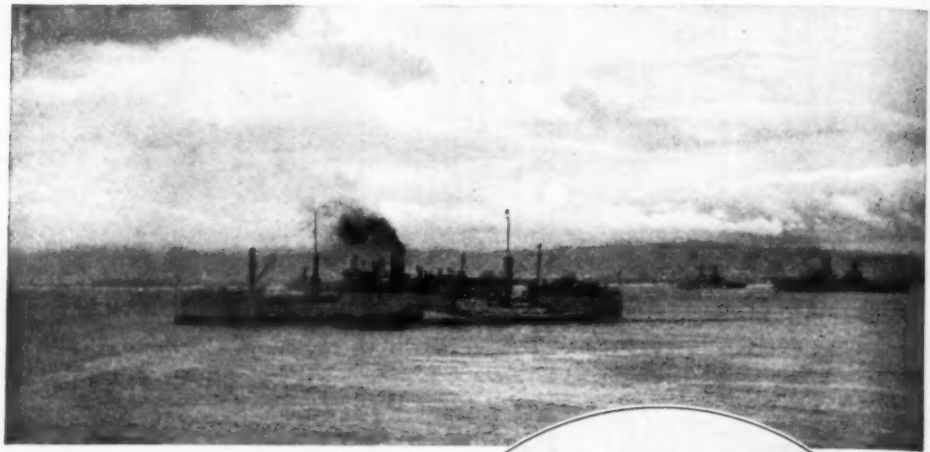
Modern Mayflower Carries



Alaska-bound, the steamer *St. Mihiel* steams out of San Francisco harbor with 274 Minnesota men, women and children—the vanguard of the Matanuska valley pilgrims.

Just as the Pilgrims built homes in the Massachusetts wilderness 315 years ago, modern Argonauts are creating new American colonies in Alaska's fertile Matanuska valley, on lonely Wake Island in mid-Pacific, and on Midway Island.

BY SHIP and by train a thousand 1935 colonists journey to Alaska, there to establish new homes in the fertile Matanuska valley. Like the Pilgrim Fathers of 1620, these families will live in log cabins, hew farms from the forest, battle with nature for an existence.

Unlike the Pilgrims, however, these modern Argonauts have at their disposal iron horses —radio—agricultural equipment undreamed of by early American colonists. Giant caterpillar diesel tractors will jerk out stumps, haul trailer trucks, plow, and grade roads.

For years a government experiment station has been maintained in the Matanuska valley. Results of crop experiments will be available to these pioneers, insuring that they plant only those crops which will be successful during the short Alaskan growing season.

In charge of this subsistence colonization project, sponsored by the Federal Emergency Relief Administration, is lean, sandy-haired Don Irwin, formerly director of the experiment station.

A modern *Mayflower* is the army transport *St. Mihiel*, shown here as it arrived at Seward, Alaska, with the 1935 Pilgrims.

On tiny Wake Island, in the middle of the Pacific ocean, another and smaller group of colonists are building homes and establishing an air base which will be used by great Clipper planes on Pan American's California to China airline. Already on the air is Wake Island's radio station, sending daily progress reports to California, to Hawaii, and to a sister colony at Midway Island, 1,400 miles away.

Matanuskan Pilgrims are drought victims

1935 Pilgrims To Alaska

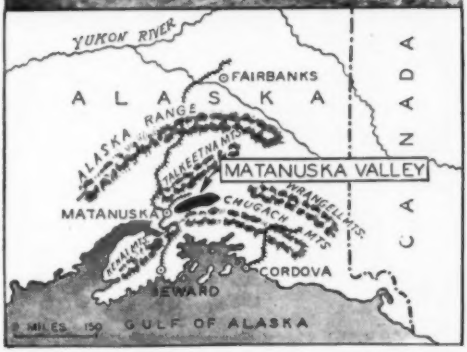
Snow-covered peaks surround the fertile Matanuska valley; this view was taken along the railroad line at Palmer, tiny valley town serving as headquarters for CCC workers.

These are the first of the tent homes erected by CCC workers for the colonists. Each tent has a wood floor and a cooking stove. At the chinked log schoolhouse in Palmer, Alaska (right), children of the Matanuska colonists will be educated.

selected from Northwestern states—Minnesota, Wisconsin, Michigan, and the Dakotas. With household goods, some furniture, and clothing they entrained for San Francisco, there to board the army transport ship *St. Mihiel*, their Alaska-bound *Mayflower*. Before them had gone the steamer *North Star*, carrying 1,900 tons of equipment and 120 workers, who prepared tents and made roads in preparation for the arrival of the main body of colonists, consisting of 200 families and more than 400 single men. In all about 500 transient workers, mostly CCC men prepared the Matanuska site for settlement.

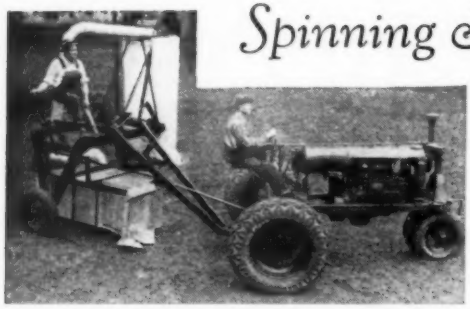
Hemmed in by tall, snow-capped peaks and evergreen-covered hills, the valley itself has

[*Continued on page* 130]



Map shows the Matanuska valley, 120 miles north of Seward.

Spinning Machine Picks Cotton



Mack D. Rust, operating tractor, and John D. Rust, on the picker, demonstrate their mechanical cotton picker, said to be first machine which gathers all of the opened cotton bolls without harming either plants or green pods. A tunnel-like hood suspended from harvester straddles a row of cotton plants. Moistened rods which revolve continually travel across the tunnel on an endless belt, and comb through the cotton plants. Cotton sticks to the wet surfaces, winds itself around the rods, but plant leaves slip past. The adhering cotton is stripped from the rods by metal fingers, and carried by suction to canvas hopper. Water is carried in small tank.

A MACHINE using the principle of the old spinning wheel to gather fluffy opened bolls of cotton without damaging the plants has been perfected by two brothers, John and Mack Rust, after long years of experiment. In 1936, for the first time, the machine will be placed on the market.

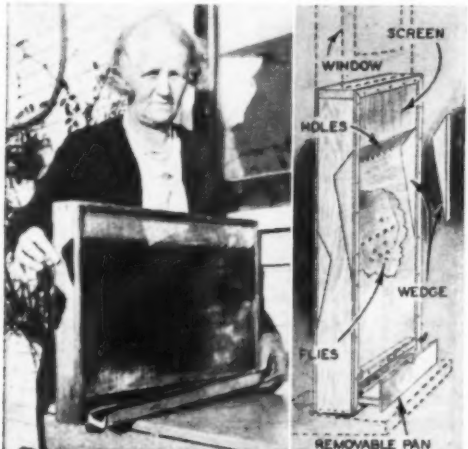
In cotton field tests of the new picker, as much cotton was gathered in a seven and one-half hour day as a hand-picker gathers in an eleven-week season. Planters who watched the tests marveled at the simplicity of the machine and at the perfection of its work.

The inventors say their machine can pick an acre of cotton at a total cost of only 98 cents.

Fly Trap Replaces Window Screen

A DOUBLE-ACTION trap which catches flies coming in or going out of a house, and at the same time serves as a window screen, has been invented and patented by Mrs. C. J. Smith of Sonoma, Cal.

Wire screen is nailed over both sides of a rectangular frame which fits snugly under an opened window. Depressions in the screen guide flies to the holes; once in the chamber, few flies can ever find the holes again. In use, the room is darkened, to allow light to enter only through the screen of the trap. The flies then crawl over the screen.



A death chamber for house flies is this double-screen device which fits into window frame. Sketch at right shows construction of trap. Exhausted flies fall into the collecting pan at the bottom. Mrs. C. J. Smith (above) is inventor.

Camera Photographs Inside of Eye

The ophthalmoscopic camera, which photographs veins and arteries far back in the eye, is being adjusted by Lorne H. Hardaker, medical photographer. Picture obtained is shown at right. The *macula*, most sensitive optic nerve, is the dark spot in the center.

PHOTOGRAPHS of the inside of patients' eyes, showing the delicate network of blood vessels and nerves which transmit images to the brain, can now be taken at the Stanford School of Medicine in California.

The Zeiss-Nordensen ophthalmoscopic camera, a gift to the school, enables physicians to make photographic records at frequent intervals of the retina of the eye, as treatment is administered for various diseases. An indirect system of lighting which does not annoy the patient is used for focusing purposes, and a powerful light lasting only an instant, like that of a flash bulb, is switched on at the instant the exposure is made. The picture obtained is many times actual size.

Power-Glider Flies 282 Miles for $1.50

USING a motorcycle engine-equipped glider, an Austrian pilot recently flew from the Croydon Airport, England, to Paris, France, at a total cost of but $1.50.

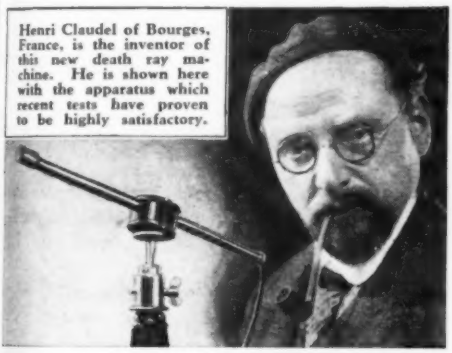
Robert Kronfeld, internationally famous gliding ace, was the pilot, and the plane used for the dangerous channel crossing was one of his own design. By careful selection of the air currents, Kronfeld made the 282-mile trip in 4½ hours.

The motorcycle engine develops five horsepower, and the midget propeller is mounted pusher fashion on the tiny craft. Because of the simplicity of construction, and low cost of repairs, oil and gas are the only expense that need be taken into consideration.

His flight was recognized by aeronautical experts as the "cheapest flight on record."

Shown above are Robert Kronfeld and his wife wheeling out the tiny plane before its record economy flight from London to Paris. Below—They inspect the motorcycle engine.

Ray of Death Kills at 6 Miles



Henri Claudel of Bourges, France, is the inventor of this new death ray machine. He is shown here with the apparatus which recent tests have proven to be highly satisfactory.

LATEST of the death rays designed for modern warfare comes from Bourges, France. Henri Claudel, well known French scientist, is the inventor.

Recent experiments with the delicate apparatus have proved it to be unusually deadly when directed at small forms of life. The inventor estimates that the machine, which he calls "Rays of Death," will kill any living thing at a distance of 10 kilometers, or approximately 6¼ miles.

The rays are projected by means of a slender tube mounted on a tripod, permitting the operator to send them in any direction or at any angle. Details regarding the construction of the death ray machine are being kept a closely guarded secret, only the results of the experiment having been made public.

Lunch Counter Makes Railway Debut

THE old style dining car lunch counter, usually to be found stationed along the highway or on some busy street corner, has gone back to the rails in de luxe style.

Added as an innovation to the streamlined B. & O. train running between St. Louis and Chicago, it immediately won the approval of the passengers, and so it will remain a regular feature. Passengers assert that because of the speed of the train between local stations a "quick lunch" is preferred to the leisurely dining car.

The latest innovation in railway travel is this "quick lunch" counter which is increasing in popularity on fast trains!

Do Meteors Hurl STARS?

by **FRANK CLAY CROSS**

Ray Brisco, right, and Pearl Conley, are shown with a meteorite fragment that fell on their farm near Fayetteville, Ark., after flashing across the sky with a glare of light and noise like a bombardment that startled three states, Oklahoma, Kansas, and Arkansas, on December 26, 1934.

DIAMONDS! Gold! Platinum! What if the heavens should open some night, with a burst of fire and a crash of thunder, to drop a stone, infiltered with diamonds, or gold, or platinum, in your back yard? No, it isn't likely to happen. Nevertheless it could happen. In several known cases the sky has actually hailed them down upon the earth.

There are some who think that the great diamond deposits in the Kimberley region of South Africa, were caused by the terrific impact of an enormous meteorite, or swarm of meteorites, which collided with our planet in some far bygone age. Right in our own country, however, near Winslow, Ariz., literally millions of the gems are buried deep under the floor of the desert in an immense mass of iron which hurtled to earth long before the white man set foot on the Western Hemisphere. There is no doubt about that. Great numbers of them have been found in fragments of the meteorite, scattered around the big crater under which the main mass is believed to be buried. Unfortunately, however, they are all too small to be of any value—so small that a microscope is necessary to see them. Other diamonds, also too small for use, have been found in a stony meteorite which fell in Russia.

It is doubtful that any meteorite, rich enough in gold to be particularly valuable for that reason, has ever fallen or will ever fall. Indeed only one gold-bearing fall has ever yet been encountered, and that a small one. The first fragment of it was found in March, 1933, near Melrose, N. M. It weighed sixty-eight pounds, and showed, on analysis, a gold content sufficient to make a ton of it worth about twelve dollars. Since the discovery of the first stone, five other fragments have been found, weighing altogether one hundred and thirty-four pounds. Therefore, the total value of all the gold known to have fallen from the sky, is only about eighty cents.

If you should become interested, for the sake of possible financial gain, in a quest for precious stones or metals of meteoric origin, you had much better look for platinum than for diamonds or gold. Nearly all meteoric iron is believed to carry platinum—in small amounts, to be sure, but not too small to be

WHAT TO DO WITH METEORITES

The comparatively young science of meteoritics depends largely upon the observations of thousands of amateurs, who report hour and path of meteor seen to astronomers or who receive cash for stones or lumps of iron bearing ore that have fallen from the skies. Meteorids are celestial travelers before becoming visible; meteors are the visible shooting stars in the air; and meteorites are meteors that have fallen to the earth.

To photograph meteors fix camera rigidly and point at a section of the sky. Open lens to f. 1.3 or 1.5 and expose for thirty to ninety minutes. Note time of beginning and end of exposure, portion of sky photographed, and time of any bright meteor seen. If meteor streaks appear, send prints for study to the American Meteor Society, Flower Observatory, Upper Darby, Pa., or write to your nearest observatory.

Meteorites are worth about one dollar a pound. An iron meteorite is usually very heavy, and, if newly fallen, will be glazed black on the outside. If an old fall, it will probably be reddish brown with rust. Sometimes it is pitted. A stony meteorite is heavier than the average earth stone and is always covered with a black or reddish brown crust.

Professor H. H. Nininger, of the Colorado Museum of Natural History in Denver and secretary of the Society for Research on Meteorites, is one of the world's foremost buyers of meteorites. If you believe you have found a meteor write to Prof. Nininger for further information.

WEALTH to EARTH?

Shooting stars, speeding through space for centuries, hurtle to the earth with their hidden messages from far off universes. Are their cargoes diamonds, gold, platinum, or iron? Here is a revealing story concerning interesting discoveries about these strange wanderers of the skies.

Prof. H. H. Nininger polishing a section of a gold bearing meteorite found near Melrose, N. M., last year. If suspected meteorite is discovered, grind surface. If grains of metal show, the stone is certain to be a meteorite.

WHEN TO SEE METEORS

A few meteors can be seen every night. They are twice as numerous from July to January than from January to July and more can be seen after midnight than before. Below is a list of meteor showers:

LEONIDS—best known shower appears to move from the constellation Leo on or about November 14.

PERSEIDS—late July and early August from constellation Perseus.

LYRAIDS or LYRIDS—from constellation Lyra in April.

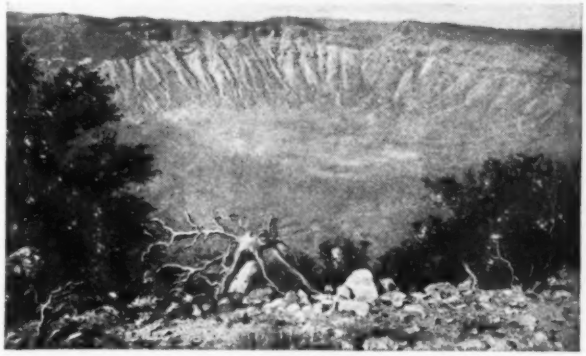
ORIONIDS—Oct. 18-20, from Orion.

GEMINIDS—Dec. 10-12, from Gemini.

QUADRANTIDS—Jan. 1-3, from old constellation Quadrans Muralis, adjoining Hercules and Bootes.

ETA AQUARIDS—May 1-11, from Aquarius.

DELTA AQUARIDS—July 27-31, from Aquarius.



This crater, believed gouged out centuries ago by gigantic meteorite near Winslow, Ariz., is a mile in diameter and about 600 ft. deep. 300,000,000 tons of earth were dislodged.

valuable if enough such iron were available for refining. Several attempts have been made to get down to the great iron mass of the Canon Diablo meteorite near Winslow, Ariz. A fortune in platinum is believed to be buried there, combined with millions of tons of less rare metals from the heavens.

Also valuable, if the great mass is ever unearthed, will be its nickel content. All meteorites, whether of iron or stone or of some mixture of the two, contain nickel, or at least no specimen has yet been found without

[*Continued on page* 127]

FACTS ABOUT SHOOTING STARS

About 24,000,000 meteors pass through the earth's atmosphere every twenty-four hours.

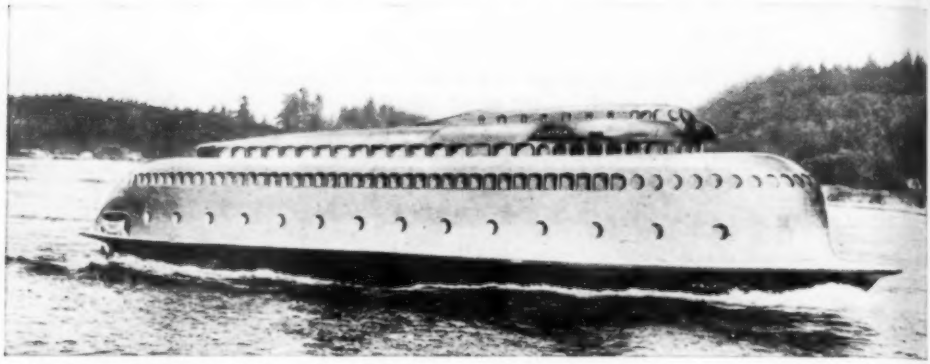
Meteors usually explode before reaching the earth due to their tremendous speeds.

Meteors have never been known to cause a loss of life.

Showers of meteors often follow the orbits of known comets. Beila's comet, first observed in 1772, separated into two comets in 1846 and was not seen again after 1852. On Nov. 27, 1872, a display of meteors was observed in its orbit.

The largest meteorite of which date of fall is known fell 14 miles southwest of Paragould, Ark., on Feb. 17, 1930. One fragment alone weighed 820 pounds.

Fully Streamlined Ferryboat Carries 2,000



This composite photo shows a 10-foot long scale model of streamlined ferryboat *Kalakala* superimposed on Puget Sound view.

THE world's first completely streamlined vessel, the ferryboat *Kalakala,* is to make its maiden run this month between Seattle and Bremerton, Wash., on Puget Sound.

Declared by marine experts to be one of the outstanding developments of the century in naval architecture, the great ship is capable of carrying 2,000 passengers and 110 automobiles. A 3,000 horsepower Diesel engine propels the boat across the sound at a speed of better than 20 miles an hour. Autos are driven in through huge doors at the bow.

Paris Balloon-Homes Are Gas-Proof

Should air raiders threaten with gas bombs, Parisians plan to seek refuge in air-tight shoe-like balloon homes. Photo below, taken inside balloon, shows family rehearsing for gas attack.

REASONING that if balloon silk can hold gases, it can likewise keep gases out, Parisians are building balloon houses—grim shoe-like affairs which provide safety from much-feared gas attacks.

Entire families will find refuge in each of the inflated structures. Fresh air would be pumped in through a filter which neutralizes poisonous gases, just as do filters on gas masks. Frames of wire hold the balloon silk in position when the air pump is not operating.

Newest Bombs Extinguish Fires

BOMBS which put out fires started by bombs were tested recently at Vincennes, France. The new fire-chasing bomb, an Italian invention, contains a secret combination of chemicals which forms a blanket of gas. Thrown on a fire, the gas quickly cuts off the oxygen supply to the flames, and puts out the fire.

These chemical bombs, thrown by hand, extinguish fires.

MM's monthly ALMANAC

Flying solo in the monoplane, *Winnie Mae*, Wiley Post landed in New York on July 22, 1933, after completing the fastest trip around the world, 15,596 miles in 7 days, 18 hours, 49½ minutes. He used a variable pitch propeller to increase his speed in upper atmosphere, a radio beam compass to guide him, and a robot pilot to relieve him on hops.

The MOON'S PHASES

Day (July)	Time (E.S.T.)
8	5:28 p. m.
16	Midnight
22	2:42 p. m.
30	4:32 a. m.

SIGNS of the ZODIAC

CANCER – THE CRAB

LEO – THE LION

JULY

1—In 1847 the first authorized postage stamps in the U. S. were placed on sale. The Klondike gold rush began, 1897.

2—British dirigible, R-34, took off, flew across the Atlantic to Mineola, L. I. and returned to England, July 13, 1919.

4—Declaration of Independence signed, 1776. U. S. Military Academy at West Point opened, 1802. The first passenger railroad in the U. S., the Baltimore & Ohio, began, 1828.

MAP of STARS in JULY

This map shows the sky at 9 p. m. July 1 or 8 p. m. July 15. To use map face south with the south horizon at the bottom.

11—In 1897, Salomon August Andree, Swedish explorer, and two companions left Virgo, Spitzbergen, in the balloon, Ornen, on an attempted flight to the North Pole. On Aug. 6, 1930, thirty-three years later, their frozen, preserved bodies were found on White Island, 117 miles from the takeoff.

16—A total eclipse of the moon will be visible in the U. S. at 11:09 p. m. Eastern Standard Time.

25—Louis Bleriot made the first airplane flight across the English Channel, Calais to Dover, 31 miles in 27 minutes, in 1909.

28—The Army Air Corps stratosphere balloon took off from Rapid City, S. D., 1934. At 60,000 feet the gas bag began to rip. The three observers jumped in parachutes.

30—A partial eclipse of the sun will be visible in the south polar regions. In 1931 Col. and Mrs. Charles A. Lindbergh left North Haven, Me., on a flight to Japan and China. In 1931 Russell Boardman and John Polando flew 5,011 miles non-stop, New York to Turkey.

Photographing BYRD'S

by TED MAGEE

Exciting and comic events of daily life in the frozen, blizzard swept Antarctic were preserved in pictures by two daring photographers. Here is their pictorial story of a South Pole expedition.

Above—John Herrmann, motion picture photographer, who brought back a living pictorial record of the second Byrd expedition. Right—Members of the scientific staff meet in their quarters in Little America to discuss plans.

FROM Antarctica, the bottom of the world, the Robinson Crusoes of Science have returned with Rear Admiral Richard E. Byrd with tons of data on the greatest expanse of unexplored land on this earth.

In the desert of ice, blizzards, and darkness of the South Polar regions the second Byrd expedition gathered more scientific knowledge in eighteen months than all the expeditions to the Ross Sea sector during the last 100 years.

The results of the expedition will be preserved in the books and lectures of Admiral Byrd, but even those who can not read can witness the actual adventures, the daily life, and the work of the Admiral and his group of explorers.

This record was brought back for millions to see in 135,000 feet of movie film, exposed by John L. Herrmann, chief cinematographer of the expedition, and his assistant, Carl O. Peterson, radio operator.

To obtain this pictorial account, the two photographers worked under all sorts of discouraging conditions and occasionally under obvious danger. Throughout the months of darkness that engulfed Little America during the South Pole's long night, the photographers obtained their action pictures by means of flares and banks of photoflood lights and entertained the group of explorers with motion picture shows in the Penguin Theater. The Penguin Theater was established in the mess room. After meals the tables were stacked along the walls, the benches placed in rows and the show started. The expedi-

ADVENTURES *in Little America*

Photos Copyright Byrd Antarctic Expedition II

Above is a partial view of the "metropolitan district" of Little America with the Fairchild monoplane, buried in the ice five years ago by the first Byrd expedition, visible in the background. There were dozens of buildings in the Antarctic city all buried beneath the snow and connected by tunnels. In the distance at left can be seen a weather observing station. The rising spring sun cast shadow of one of the radio towers from which this photo was taken.

Below—In a tiny, snow-buried hut Rear Admiral Byrd carried on his studies alone 123 miles south of Little America. He made weather observations and read 85 books. It was here he waged a losing battle against poison caused by kerosene fumes. He was rescued after two attempts to reach him over the frozen trail.

tion carried 97 feature length motion pictures from eight Hollywood studios, in addition to comedies and even a travelogue.

"The pictures lasted pretty nearly through the winter night," Chief Photographer Herrmann said. "When we had shown them all, we voted on favorites and showed them over again. You can be sure that the Penguin Theater had the most appreciative audience in the Americas — North, South, and Little.

"When daylight finally arrived, we were anxious to get moving. The first few days of twilight were devoted to digging out from the snow drifts. There was a lot of shoveling to be done and everyone

FLARES LIGHT WAY FOR EXPLORERS IN POLAR NIGHT

had to pitch in." After five airplanes were dug out of their igloo ice hangars, the work of aerial exploration began. The expedition brought three of the planes to the Bay of Whales, the other two having been left buried in the ice by the previous Byrd expedition.

Before the long night descended on the little colony the hangars were dug into the snow. Rectangular snow blocks were cut and used for constructing the walls high enough to clear the top of the wings. The blocks froze in position. When the planes were towed into place by tractors, the front and rear walls were erected. Bamboo poles were placed over the hangars and covered with tarpaulin to form the roof. Blizzards delayed the work twice, and after the storms the men had to dig the planes out from under the snow. Through the long Polar night, the ships rested snugly under a blanket of snow while the mechanics overhauled the engines in a subterranean shop and installed instruments in the ships. When the sun finally rose again, the planes were dug out. Buried for five years under tons of snow and ice, the Fairchild and Ford ships, abandoned by the previous expedition, were found to be in fairly good condition after excavation.

After the planes were dug out of their hangars, the photographers spent a great deal of their time in the air. The two men made 26 flights for pictures. In fourteen months, under the direction of Admiral Byrd and Chief Pilot Harold June, the planes made 142 flights and flew a total of 12,900 miles, using more than 6,000 gallons of fuel and 500 gallons of oil. The fliers, accompanied by scientific

Below—The giant Cyclone-powered Curtiss Wright Condor plane as it appeared in its snow hangar after the long winter night. Saws, picks, and shovels had to be used to free the ship. Note snow blocks used for building hangar.

RISKED LIVES RIDING ICE CREVASSES IN TRACTORS

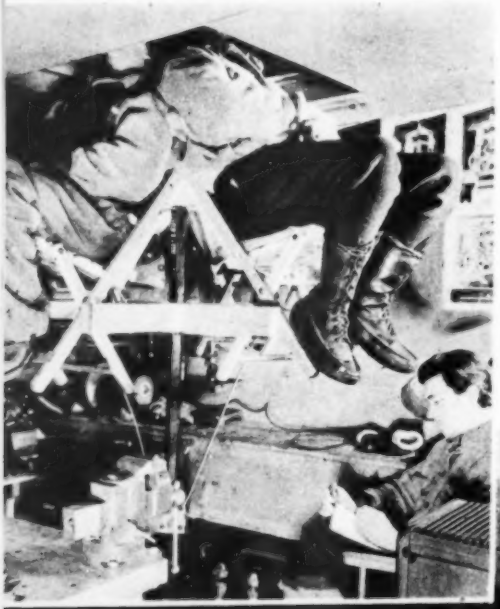
members of the expedition, explored more than 100,000 square miles of territory.

In addition to obtaining a photographic record of the terrain for study and mapping purposes and carrying instruments for scientific data, the planes themselves were used to determine the topography of the barren continent of Antarctica. Contour lines were obtained by bringing the planes down every twenty miles until their skids touched the snow and surface altitude checked by reading the altimeter.

Peterson had his closest escape from death during a trip through Marie Byrd land en

Photographer Peterson and a group of men had to dig this tractor out when it became lodged in a 35-foot crevasse. Below—Dr. Thomas Poultier, of Iowa Wesleyan, loading a plane with instruments for studying polar cosmic rays.

Magnesium flares cast long shadows in the piled ridges of pressure ice as the explorers carry on in the long polar night. Skis, tractors, and dog sleds were principal means of travel during the Antarctic night. At least 22 branches of science were represented in data gathered by Byrd's expedition.



MESS ROOM BECOMES

route to the Edsel Ford range by tractor. With three men he had set out to record pictures of the journey. Suddenly, after several days journey, a blizzard sprang up. The wind was suffocating in intensity.

As the blizzard grew worse the men pitched a tent next to the tractor, one of them staying in the cab of the latter. The storm grew worse and lasted for a week. The wind blew so hard that it was impossible to venture outside and the man in the tractor cab had to remain in the cab for a week, while the other three took turns holding up the tent. After it was all over, the difficult task then began of digging out from the snow drifts.

Herrmann had his one dangerous experience when he broke the camp rules and ventured off alone in the spring twilight. The haze obliterates everything and without a horizon it is very easy to become lost. Herrmann went down to view the seals, and thought he was returning in the right direc-

Photos at left show how observations were made at buried Little America. At top George Griminger, the assistant meteorologist, releases a balloon at night to study air currents. Two members of the staff are shown in the lower photo studying meteors from their suspended platform.

A midwinter night meal in the mess room at Little America. After dinner the room was converted into the Penquin Theater where feature movies were shown. Note blackboard in background with menu and evening's movie program.

THEATER FOR BYRD'S MEN IN UNDER-ICE COLONY

tion. He wore a wool shirt and a windproof —a very light but warm bit of clothing which largely replaced furs for warmth. It was 22 below zero. For nine hours he tried to find his way back. Finally he began back tracking and reached camp utterly exhausted with one foot partly frozen.

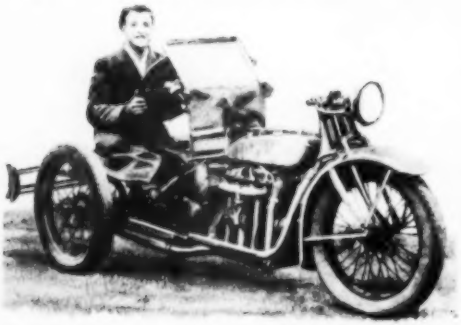
"Both of us were on the scene when the big Fokker high wing monoplane crashed shortly after taking off," Herrmann said. "I had to pick up my camera and run for fear of being hit, but the shots we got were both close up and distant. The big ship wobbled as it took off. We had our cameras set to take scenes of general activity. When the Fokker began wobbling, we swung our cameras into position. For a moment it disappeared from sight, then re-appeared very close. We were both grinding away as it crashed.

"Speaking of shots, we brought back one scene that is a knockout. One of the boys was given a whip and a chair and made to enter a snow arena. He was told that he would be facing a wild animal. We started grinding the cameras. He came in warily and waited

[*Continued on page* 141]

Hundreds of stamp collectors had their Byrd covers cancelled in Uncle Sam's post office at the bottom of the world shown in photo above. Bitter cold froze the cancelling machine. Below—Fokker high wing monoplane after crashing in high shifting winds, a constant risk to aviators in Antarctica. Cameraman Herrmann had to run with camera to escape injury.

Cycle Engine Gives 50 m.p.h. Speed to Wheel Chair



Unable to walk without crutches, Norman Tapper (above) built this high-speed three-wheeled car for cross-country trips. Control lever extensions are within reach of driver's hands.

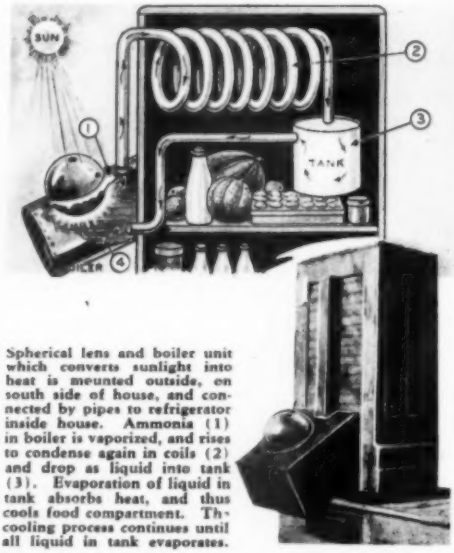
A THREE-WHEELED chair built around a motorcycle engine brought Norman Tapper, 23-year-old Californian whose legs have been paralyzed since childhood, to Indianapolis almost a month before the start of the 500-mile auto race. The motorized chair was parked at the gate of the Speedway, to make certain of a good position on the day of the race.

Tapper asserted that this novel wheel chair, which he built himself from motorcycle and automobile parts, reached 50 miles an hour on the long drive from California to Indianapolis.

Refrigerator Uses Solar Energy

A REFRIGERATOR which requires no energy other than exposure to sunlight for two hours a day has been developed by Otto H. Mohr, California consulting engineer. Larger solar power units requiring up to four hours exposure can be used for heating or cooling entire homes, according to the inventor. A spherical lens catches the sun's rays at all hours of the day.

This lens gathers the rays, and changes the light into heat which is transferred to the refrigerating liquid, usually ammonia. The cooling operation is similar to that of ordinary gas refrigerators.



Spherical lens and boiler unit which converts sunlight into heat is mounted outside, on south side of house, and connected by pipes to refrigerator inside house. Ammonia (1) in boiler is vaporized, and rises to condense again in coils (2) and drop as liquid into tank (3). Evaporation of liquid in tank absorbs heat, and thus cools food compartment. The cooling process continues until all liquid in tank evaporates.

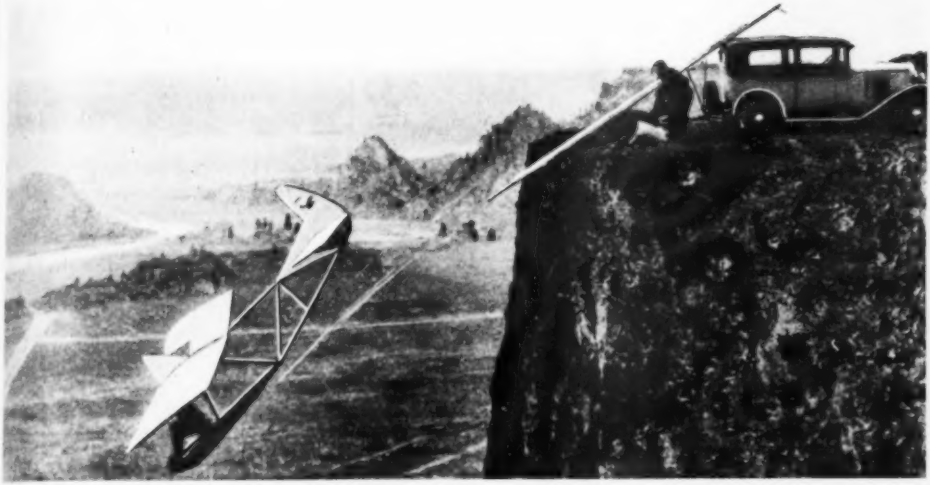
Captive 'Chute Trains Novices

Amelia Earhart joins the Caterpillar club in this jump from a 125-foot tower in a captive training parachute.

NO LONGER need the fledgling parachute jumper make his initial hop in fear and trembling from an airplane 5,000 feet in the air. At Prospertown, N. J. there has been erected a commercial parachute training device for novices that has all the comforts of home.

The training parachute is hoisted by motor to the top of a 125-foot tower from which the beginner makes his jump. The 'chute is then guided back to the ground by four steel cables attached to a boom at the top of the tower and which fit into the parachute rim.

GLIDER Launched From Auto Over Cliff



Using a greased plank for a runway, this intrepid flier launched his glider from a 1,000 foot cliff in Seattle, Wash. He dropped 500 feet before gaining flying speed.

PLENTY of nerve and a thousand foot cliff are all that are needed to launch a glider in the thrilling manner devised by Cloyd Artman of Seattle, Wash. A greased plank tilted from an automobile and extending over the lip of the cliff formed his abrupt runway. In his first flight he made a breath-taking drop of 500 feet before gliding to safety.

"Dope" Prevents Plane Fire Spread

AIRPLANE cloth, "doped" with a boric acid borax mixture, will not ignite even when covered with flaming gasoline, tests conducted by Dr. Gordon M. Kline of the U. S. Bureau of Standards revealed recently. With the wings and fuselage of an airplane coated with the "dope," fire hazards would be reduced to a minimum in the event of a crash as flames would be slow to spread, Dr. Kline believes. Trapped victims would have time to escape.

Insect Inspires New Plane Design

TO A SMALL insect called the Elytrope goes the credit for furnishing the design for the unique plane constructed by M. De Rougie, of Paris, France. The remarkable powers of the insect to maintain a horizontal position while in flight, even in high wind, lead the inventor to believe the verticle position of the insect's tail was not a matter of chance. Test flights have proven him correct.

This is an Elytroplan, not a picture of a crack-up. It was engineered by M. De Rougie after a close study of the flight of the insect Elytrope. Note the position of the rudders on the wing tips, and the streamlined gasoline tank mounted above the tiny motor on the fuselage. In test flights the craft, which has a weight of 440 pounds and a wing spread of 34 feet, has proven unusually stable in all weathers. The motor develops 25 horse power.

The World's W

Death watches grimly over everyone. What occupation has the greatest toll of accidents and deaths? Is it daredevil stunting, or a common job? The answer is surprising.

"COME quick! There's a man hurt!" Almost ten times every minute, more than 4,000 times each working day, that cry resounds somewhere among America's great mass of industrial workers.

Once every ten minutes that cry means death for another working man. In 1933 it sounded the death knell of 46 men a day. In 176 cases daily that cry disabled men for life. For the remaining 3,800 it meant some temporary injury, more or less serious.

These dying, injured, and maimed men were following ordinary jobs in most cases. They were not stunting aviators, daredevil race drivers, or human flies. Who then has the most dangerous job?

Is it the man who defies death to thrill the public? Or is it the man who burrows deep under the earth to find concentrated warmth for his fellow human beings? Or is it the man who walks unafraid along narrow steel girders hundreds of feet above the earth to build man's rising skyscrapers?

The answer to all these questions is surprising. The aviator, the racing driver at Indianapolis or Daytona, and the electric power lineman, handling death-bearing cables without fear, have dangerous jobs.

Above—The structural steel worker nonchalantly strides along a narrow beam. Is construction work most dangerous? At Boulder Dam alone up to spring of 1935 eighty-seven men were killed. Or is it mining? Right—Rescuers freeing miner from collapsed timbers.

Most Dangerous JOB

by
H. H. SLAWSON

So, too, has the man who shoots nitroglycerin blasts in the oil and gas fields.

These, however, do not have the world's most dangerous job.

On the graphs and charts of the National Safety Council the data on "the most dangerous job" has been plotted to the last pin scratch and the verdict, rendered with mathematical certainty does not allot the dubious distinction to the aviator or the others. Spectacular and dangerous as their occupations may be, they step gracefully aside in favor of a man whom most of the world forgets. Deep down in the bowels of the earth he will be found, toiling in the grime and darkness to dig the coal that keeps civilization warm and industries humming with power.

With an accident frequency rate of 65.28 per million man-hours of exposure, say the Safety Council figures, the coal miner works at the world's most dangerous job.

There are approximately a million miners in this country. While these men are working just one hour of one working day, more than 65 of them will be injured at their work.

The miner then has the world's most dangerous job.

Second to mining, is lumbering. This oc-

Black damp endangers the lives of foundation builders as much as miners. Above—Workman in deep skyscraper caisson. Below — Lineman handling high voltages is safer than lumberman who cuts trees for poles.

The home is really more dangerous than the shop or office. Twenty persons were injured when a leaking gas pipe exploded in this building. Statistics show that unemployed men are in much greater danger of death than workingmen.

Lumbermen Defy Death More Than Daredevil Racers

cupation has an accident frequency rate of 59.67 per million man-hours of work. Third in the list of most dangerous occupations is the construction industry with a rate of 55.66.

And what is the safest job? At the top of the list of some thirty industries, accounted for in the figures of the National Safety Council, stands tobacco processing with a frequency rate of only 1.43, the safest occupation in this country!

For many years coal mining has led all other employments in the annual number of fatal and permanent injuries suffered in accidents. Death dogs every stroke of each miner's pick and no one can tell when the next one, by disturbing the fine balance of nature, will bring an avalanche down upon another helpless human being in the darkness. Over fifty per cent of the fatal and permanent injuries suffered by coal miners occur in these sudden falls of walls and roofs.

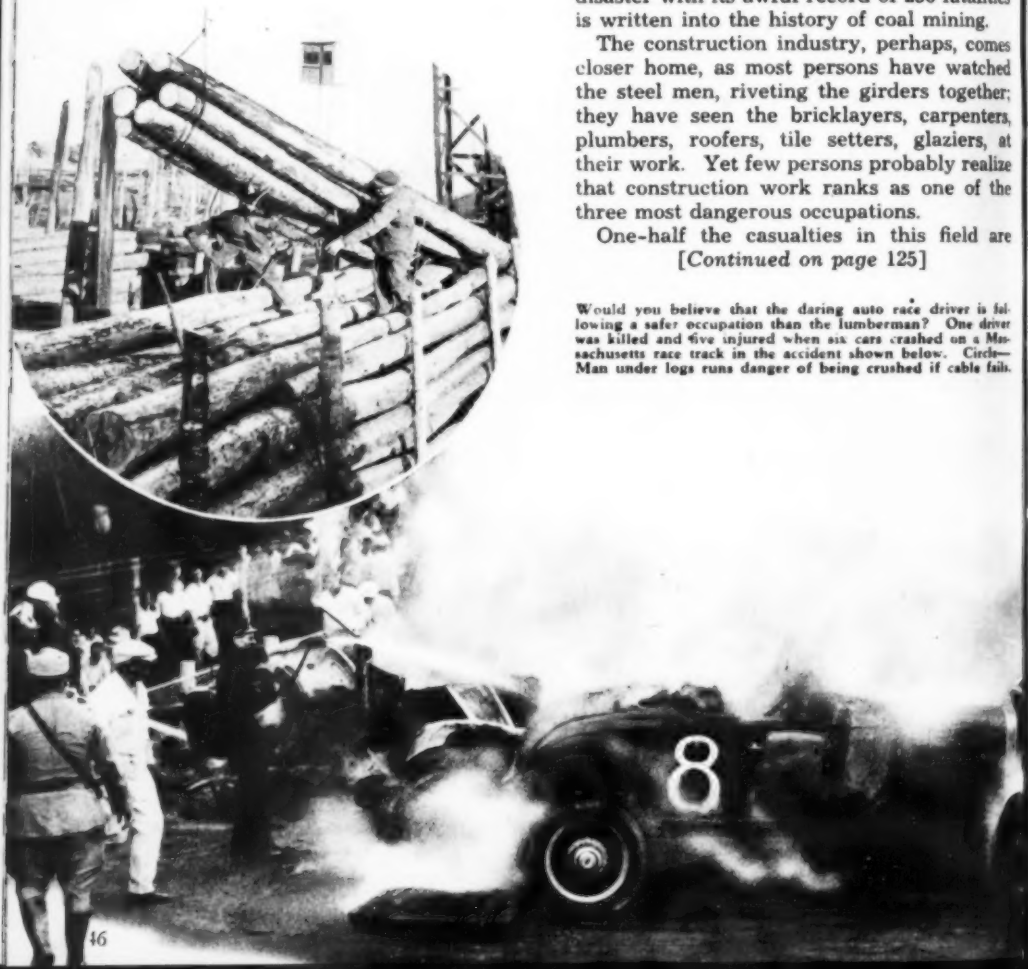
Other disabilities are caused by the cars used underground, which run wild and kill and maim. Motors short circuit, to burn and sear before currents can be cut off. Hoisting apparatus fails and cages filled with men plunge down to death. Fuses miss fire; someone goes back to see what's wrong and the delayed explosion blows him to atoms. Black damp suffocates; dust explodes; gas shoots out with the force of a projectile.

And then, on top of all this frequent horror, a bale of hay is lowered down a shaft. It stands for a moment beneath a leaking kerosene torch and a catastrophic Cherry mine disaster with its awful record of 256 fatalities is written into the history of coal mining.

The construction industry, perhaps, comes closer home, as most persons have watched the steel men, riveting the girders together; they have seen the bricklayers, carpenters, plumbers, roofers, tile setters, glaziers, at their work. Yet few persons probably realize that construction work ranks as one of the three most dangerous occupations.

One-half the casualties in this field are

[*Continued on page* 125]



Would you believe that the daring auto race driver is following a safer occupation than the lumberman? One driver was killed and five injured when six cars crashed on a Massachusetts race track in the accident shown below. Circle—Man under logs runs danger of being crushed if cable fails.

THE SWAN

NORMANDIE Sets Two Atlantic Records

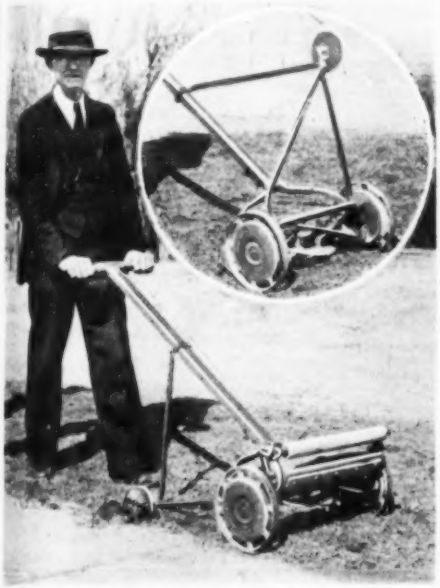
TO AN ovation second only to that accorded Col. Lindbergh, the new French liner, Normandie, docked in New York harbor on her maiden voyage after breaking all trans-Atlantic speed records.

The Normandie also broke the record on its return trip to France. It made the eastward crossing in 4 days, 3 hours, 28 minutes, averaging 30.31 knots.

The 3,192-mile crossing from Southhampton to Ambrose Light was made in 4 days, 11 hours, and 42 minutes, compared to the old record of the Bremen 4 days, 16 hours, 15 minutes.

A view of part of the thousands who turned out to welcome the Normandie to New York City. Inset—The new French stamp commemorating the ship's first voyage.

Sod-Trimmer Fits Any Lawnmower



Inventor Cripe of Broken Arrow, Okla., demonstrates his sod-trimming attachment for lawn mowers. Position of device while using mower for grass-cutting is shown in circle.

SOD can be trimmed back neatly around sidewalks or flower beds with a disc wheel arrangement designed to fit any lawn mower. The attachment, invented by Joe Cripe of Broken Arrow, Okla., is simply an eight-inch diameter steel disc mounted on a strap iron tripod which clamps to the back of the mower handle and to the frame. To use the wheel, the mower is inverted and pushed along. The downward pressure on the handle determines the depth to which the disc will cut.

Two-Voltage Car Radio Is Portable

A PLUG-IN arrangement which permits operation from a 6-volt auto battery or from 110-volt A.C. current is a feature of a new portable 5-tube radio receiving set.

This 5-tube superhet radio, now on market, operates from either 6 volts d.c. or 110 volts a.c.

Phonograph Pickup Uses Photo-Cell

SOUND waves are sent over a light beam in the newest of phonograph pickup units to be developed in Germany. A beam from a tiny lamp is directed on a mirror mounted on the needle. Light reflected from this mirror as the needle vibrates varies the current flowing through a photo-electric cell. The current is then amplified in the usual manner by radio tubes, then run to a speaker.

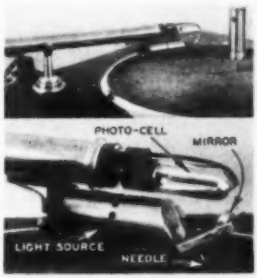


Photo-electric phonograph pickup converts vibrations of needle into light beam variations, then into electrical impulses, to give high quality reproduction of disc records.

HOW TO DIVE

Georgia Coleman, Olympic diving champion, is just beginning to straighten out after a jack-knife, in photo at upper left. Below are three American diving champions in three graceful swan dives.

The camera catches Georgia Coleman in her graceful version of the difficult backward somersault dive.

WHETHER you dive for pleasure or for championships, grace, poise, and coordination of mind and muscle are essential to that beauty of perfection which makes diving the most enthralling of sports.

Confidence, of course, must be the beginner's goal. Once this first requisite is mastered, you are prepared to go on to the two other elementary functions—coordination and balance.

Most dives are merely combinations of five basic dives that form the nucleus of the art. We shall describe each of these in turn.

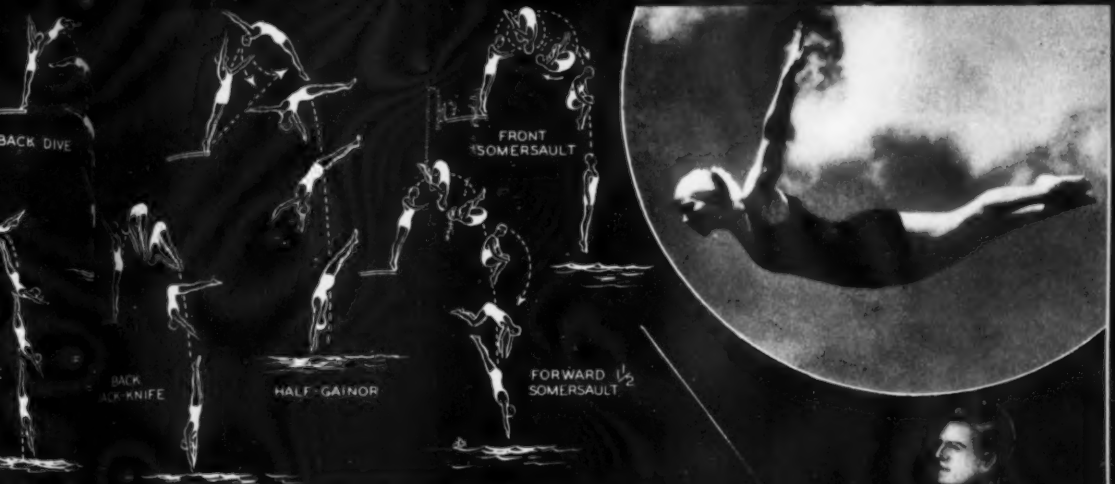
Simplest of all dives, of course, is what is commonly known as the plain front dive, but which, in the vernacular of the expert diver, is called the *plain header*. This one may be either the standing or running plain header.

In the standing plain header, the diver must first warm up by springing, then walk to the end of board and assume a position with the body straight, the head held well up, the feet together and the arms held together above the head.

Now lean forward without bending at the hips. As you feel yourself falling out of balance, spring forward and out, at the same time throwing the feet up and keeping the head well up, but not bent backwards. The body remains straight with the back slightly hollowed, but not excessively.

By throwing your feet well up you will never land flat on your stomach. Keeping the head sufficiently high precludes any possibility of your feet carrying you over too far. The action of the head is invariably a definite factor in controlling the movement of the body in the air.

The entry into the water, in any dive, must be accomplished with a minimum of water disturbance, the bearing of the body un-

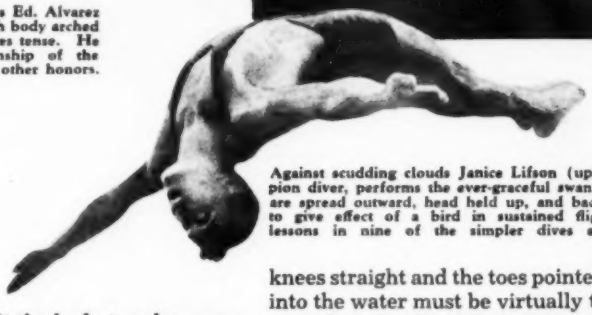


VE GRACEFULLY

by **STANLEY BRAUNINGER**

Swimming Coach, Lake Shore Athletic Club, Chicago

This remarkable photo shows Ed. Alvarez at the top of a back dive, with body arched perfectly, arm and leg muscles tense. He holds the diving championship of the Hawaiian Islands and many other honors.



Against scudding clouds Janice Lifson (upper right), champion diver, performs the ever-graceful swan dive. The arms are spread outward, head held up, and back arched slightly to give effect of a bird in sustained flight. Blackboard lessons in nine of the simpler dives are given above.

altered. Never permit the body to relax completely on making the entry. This insures a vertical entry and hence the completion of a perfect dive.

The *backward header* is the second of the basic dives. It differs in small details from that of the plain front header. The diver stands on the tip of the board, with heels not touching. Here, again, the feet must be together and the arms held together above the head.

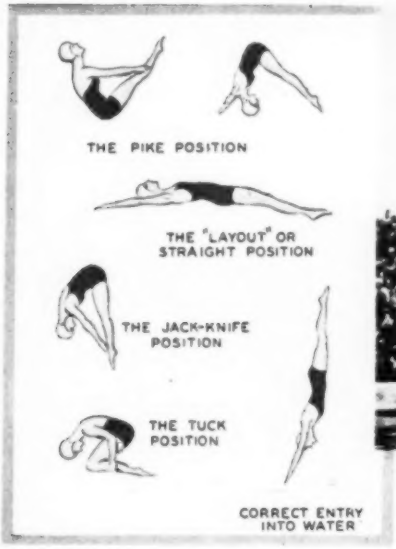
Now lean way back until you can almost see the water, always keeping the head back and the back arched. A little spring off the board is required to get the proper height; as you gain confidence, spring a little higher each time instead of falling backward off the board. As the body reaches its highest point in the air, drop the head backward, keeping the knees straight and the toes pointed. The entry into the water must be virtually the same, except that the diver is facing in the opposite direction from the plain front header. Confidence is necessary in the back dive more than in any other dive.

Moving on to the third of the basic dives, we encounter the *half gainor*, a bit more difficult than either the plain header or the back dive. This dive is also known as a reverse backward header. The approach for the half gainor is the same as in most other front dives, but the lift off board is drastically different.

In other dives your body carries up and out, but in the half gainor your body carries up and out and the dive is formed back toward the board as the body describes an arc in mid-air. In starting the dive you must realize that height and deliberation are necessary to a graceful half gainor.

Following this suggestion, the diver must

DELIBERATE MOVEMENT BRINGS GRACE TO DIVERS



Helen Meany, Olympic diving champion, is shown above just completing a graceful forward jack-knife dive. The sketches at the left illustrate a few of the more common diving terms. The two forms of the pike position are used in jack-knife dives. The tuck position is a part of all somersault dives. Back dives use the straight position.

get a good spring off the board. Then as the body reaches the highest point of ascendency, the head is thrown well back and the feet thrown forward to perform the arc. At the same time you must throw the chest up, arching the back.

The descent then begins as you are facing the board. The entry, of course, must be made in the same manner as in other dives. This dive may be performed either with the arms together, or outstretched in a swan position. The swan position is preferable, except in the case of the beginner who may best keep his arms togther.

A comparatively easy dive is the fourth of the basic dives—the *running front jack-knife.* The diver makes the same approach as for all other running dives. You must get a good spring off the board, because height is all important in a successful jack-knife.

At the take off, lift upward as though reaching for a bar above the head. When the body has reached the highest point in the air, the hips are bent vigorously so as to bring the legs up to the hands, keeping the legs straight at all times and the head erect. Touch the ankles or toes, at the same time holding the bent position until the beginning of the descent. At this point straighten out swiftly, but easily, and prepare the body for the entry.

The purpose served in bringing the legs up to the hands instead of reaching down is for more height, better control and a more graceful jack-knife. The jack-knife often is practiced at great length by expert divers in an effort to accustom themselves to getting more height in other dives.

A variation of the jack-knife is the back jack-knife, essentially the same as the front jack-knife. On the take off the diver springs upward and backward, holding the arms outstretched at a forty-five degree angle. As the body reaches the highest point of ascent, the hips are bent vigorously upward; from this point the dive is the same as the front jack-knife, except that you descend with your back to the board.

The back jack-knife is a valuable practice dive in that it teaches height for backward dives.

One of the most graceful of dives is the swan dive. It is nothing more than the plain front header with the arms outstretched to give the appearance of wings, yet the swan dive is most difficult to master correctly.

The approach, again, is identical with those of other front dives. The head must be kept up at all costs. The arms may be held together until the body approaches mid-air. Then they are extended laterally and at right angles to the body. Do this slowly and surely so as to give the effect of a bird in sustained flight. Hold this position until shortly before the entry into the water.

Jane Fauntz, Olympic diving star, is per-

[*Continued on page* 129]

Tiniest Bi-Motor Plane Carries Four

A TINY bi-motored monoplane, designed for the private pilot who demands safety as well as economy of operation, is now undergoing flight tests in Los Angeles. Production will begin shortly on two, three, and four-place body styles, the retail price being set at $2,500.

Gasoline mileage is even better than that of most autos, one gallon of fuel being sufficient for an 18-mile flight. Either one of the 45 h.p. radial engines is capable of keeping the plane in the air.

The first ship was designed and built by W. A. Hammond and George B. Fuller of Los Angeles. Top speed is 115 miles an hour.

W. A. Hammond, designer smallest American bi-motored plane, points to one of the three-cylinder radial motors. Specifications are: Wing spread—34½ ft., top speed 115 m.p.h., cruising speed 100 m.p.h., net weight 850 lbs., carrying capacity 700 lbs. Both air and wheel brakes are used.

Push Buttons to Read Timetable

Press a button on this machine to bring into the window a card giving train times. To eliminate tedious thumbing through timetables, inventor Nicholas Sandor (above) designed this "Mechanical Informator" which gives train times for any station when proper button on the keyboard is pressed.

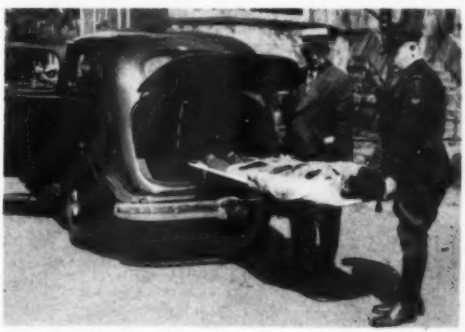
ROBOT timetables at the Victoria railroad station in London, England, are giving train-times for any station at the touch of a button on a typewriter-like keyboard.

The machine, designed by inventor Nicholas Sandor to save time for busy travelers, is popularly known as the "Mechanical Informator." Dozens of levers and linkages beneath the keyboard throw the called-for time cards up into the window.

Squad Cars Become Ambulances

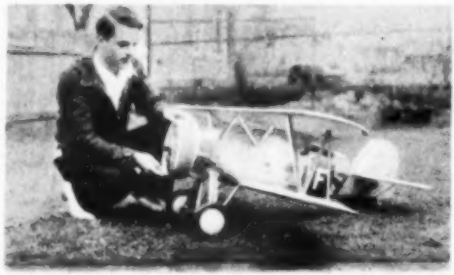
FATAL delays between the arrival of the police at the scene of an accident, and the subsequent arrival of the ambulance are being reduced by a squad car-ambulance now in use by the highway police on the outskirts of Chicago.

There are two seats in the car, one in front for the driver, and one in the rear for the companion patrolman. The entire right half of the car is left free for the stretcher and patient. Suspension springs hold the stretcher in place and reduce road shocks. The patient is loaded into the car from the rear end, and can be taken directly to the emergency hospital.



Sheriff John Toman, Chicago, illustrates the manner in which the patient is placed in the new squad car-ambulance used for emergencies from beyond the city limits.

Boeing Navy Plane Model Has 40 m.p.h. Cruising Speed



This accurately scaled model plane, placed on market recently, has midget gas engine which gives it cruising speed of 40 m.p.h. in air. Weight of plane with engine is 3¼ lbs.

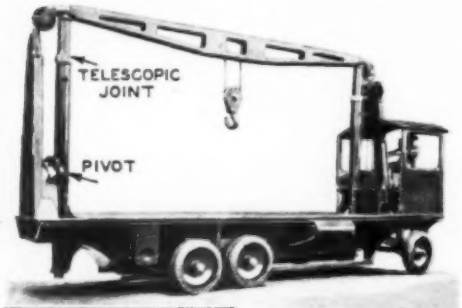
SCALE models of the Boeing F4B4 Navy fighting plane, which are powered by midget gasoline motors and actually fly, are now being manufactured by one model airplane corporation. Although weighing only 3¼ pounds complete with the one-fifth h.p. motor, the model has a wing span of 68 inches.

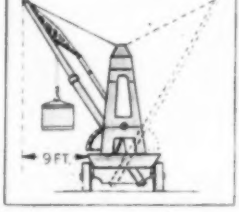
The plane will fly for 15 minutes or less, depending upon the amount of fuel placed in the tiny tank. Top speed is 40 m.p.h., and landing speed 10 m.p.h. Takeoffs and landings are automatic, once the controls are set. The model is exactly one-fifth the size of the original navy plane.

The rudder is usually set for a circular flight over a large, smooth field on which the ship can land without crashing into trees.

Truck Carries Own Gantry Crane

HEAVY German trucks now carry their own loading cranes, which can be operated from the driver's cab. Loads as great as five tons may be lifted from the ground on either side of the truck, and placed on any part of the truck's body. Telescopic supports, operated by compressed air, allow the cross beam to be raised 24 feet above the ground. A separate engine is used for the crane.





Gantry crane structure on this German truck tilts to either side and rises on telescopic supports to load truck. Capacity of crane is five tons. Driver controls crane from cab. Separate 8 h.p. engine which operates hoisting winch is under truck body. Maximum height of gantry is 24 feet, minimum 12 feet above ground.

Book Rack Is Built Into Armchair

Sides of this upholstered chair open out, to reveal roomy compartments for magazines. Paul Miller is the designer.

PAUL MILLER had an idea for combining a magazine rack with an armchair. His sketches showing how anyone could build such an upholstered chair with a folding front seat from a Ford coach, a few pieces of wood and plywood, some padding, and a good piece of fabric brought him first prize in the January, 1935, MM Furniture Contest.

Further developing his idea, Miller has designed an attractive upholstered easy chair with his same folding rack for magazines or books in each arm rest. The racks open outward easily and automatically fall back into position, where they are scarcely noticeable. The complete chair is now on the market.

PARAGRAPH ODDITIES OF SCIENCE

MULTIPLY any number by nine, and the sum of the figures in the answer will always be a multiple of the number nine. Adding, and re-adding if necessary, of the figures in this multiple will always give a total of nine.—Mrs. L. N. Doud, Black River Falls, Wis.

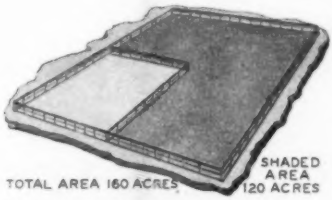
Mount Wilson's 200-inch reflecting telescope, now under construction, will not magnify the stars. Larger reflecting mirrors gather more light from distant nebulae, and therefore penetrate farther.—Lt. Don Benn Owens, Jr., Dayton, Ohio.

The moon stretches the ocean bottom between America and Europe as much as 32 feet, and at other times brings the two continents 32 feet closer to each other. Scientists used astronomical clocks to measure these earth tides.

American seagulls show mathematical ingenuity in cracking clams. When dropping the shells on hard sand, they rise to about 50 feet; on a concrete road a 20-foot drop is enough to split the shell and expose the meat for food.

The earth's magnetic field wards off a bombardment of electrons which scientists claim could kill every living creature. If all iron deposits were removed, the magnetic field would disappear, and life could continue only in underground cities.

It takes just as much fencing to enclose a 120-acre tract of land as it does to fence in 160 acres. — Mrs. L. N. Doud, Black River Falls, Wis.



Pure iron is rarer than gold. It can be produced only by an electric furnace enclosed in a vacuum.—Paul Webber, Kansas City, Mo.

The ink never dries on United States paper money. Genuine currency will leave a mark when rubbed on a piece of white paper; counterfeit money oftentimes will not. —J. L. Kamber, Manchester Depot, Vt.

A bar of steel costing five dollars, when made into watch springs, is worth $250,000. This same bar of steel is worth $10 when made into horseshoes, $350 in the form of needles, and $32,000 if made into pen knife blades.—Clyde Olson, Minneapolis, Minn.

More than three billion pounds of coffee, enough to supply the world's needs for an entire year, have been burned in Brazil since July, 1931, in order to keep prices up.

Layers of tissue, peeled from the bark of a tree named Tauari by Brazilian natives, are used as cigarette papers. The layers of wood fiber are even thinner than those of the American birch. — A. Mesquita Pinheiro, Manaos, Amazonas, Brazil.

To illuminate a room with photoflash bulbs for one hour would require 18,000 bulbs costing $45,000. The life of one bulb is approximately one-fiftieth of a second.—Walter Ohio, Elmhurst, L. I., N. Y.

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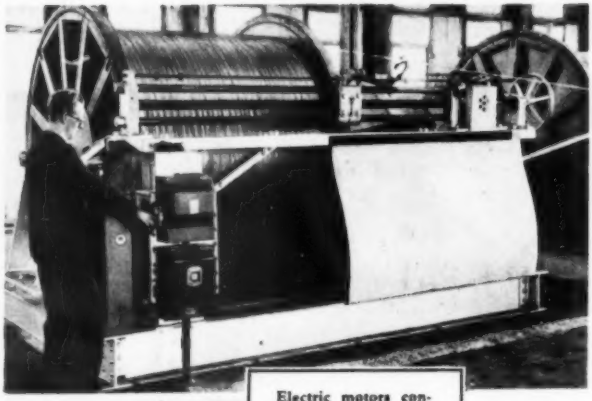
How Mechanical SPIDERS



Electric motors control the speed of the wire reel to maintain constant tension. Each reel contains over 70 miles of wire.

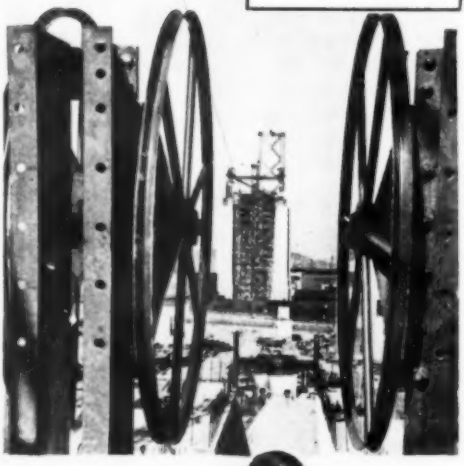
by C. W. GEIGER

This article describes in simple language how a wire long enough to encircle the world three times is carried back and forth across San Francisco Bay by traveling wheels to spin the suspension cables of the world's longest structure, the mammoth San Francisco-Oakland Bay Bridge.

BY FAR the most spectacular operation in the construction of a suspension bridge is the spinning of the mighty cables which loop gracefully from tower to tower, supporting a roadway hung far below. How are these mile-long cables, each weighing 9,500 tons and containing 17,464 strands of steel, being stretched from tower to tower for the San Francisco-Oakland Bay suspension bridge?

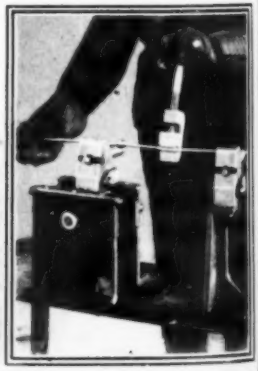
Suspension bridge cables are formed in mid-air, wire by wire, and not at some cable-making factory. Men and machines, working hundreds of feet above water, carry pencil-thick wires back and forth over mile-long aerial pathways between anchorages. Powerful jacks lift strands of wire with mechanical precision into saddles of steel atop lofty towers of steel and concrete. Delicate instruments check the sag of each wire, and adjust tension to divide the enormous load of cables, roadway, and vehicles with mathematical precision.

Cable spinning work is now well under way



These grooved wheels at the San Francisco anchorage guide the wires of the main bridge cable.

Ends of wire are beveled by this grinding machine before splicing with the turnbuckle-like threaded sleeve shown at right, which cuts threads in wire.



SPIN Bay Bridge Cables

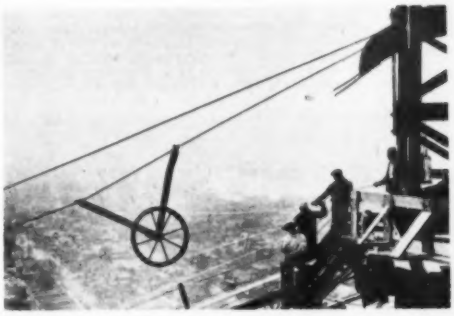
on the San Francisco-Oakland Bay bridge and on New York City's great Triborough suspension bridge. It is scheduled to start shortly on the Golden Gate bridge, greatest suspension span in the world. The following description of cable spinning work on the San Francisco-Oakland Bay bridge will apply as well to the other bridges, even though minor details and cable specifications are different.

There are in reality two separate suspension spans in the Bay bridge, one from San Francisco proper to a massive concrete center anchorage in the bay, and the other from this anchorage to rocky Yerba Buena Island.

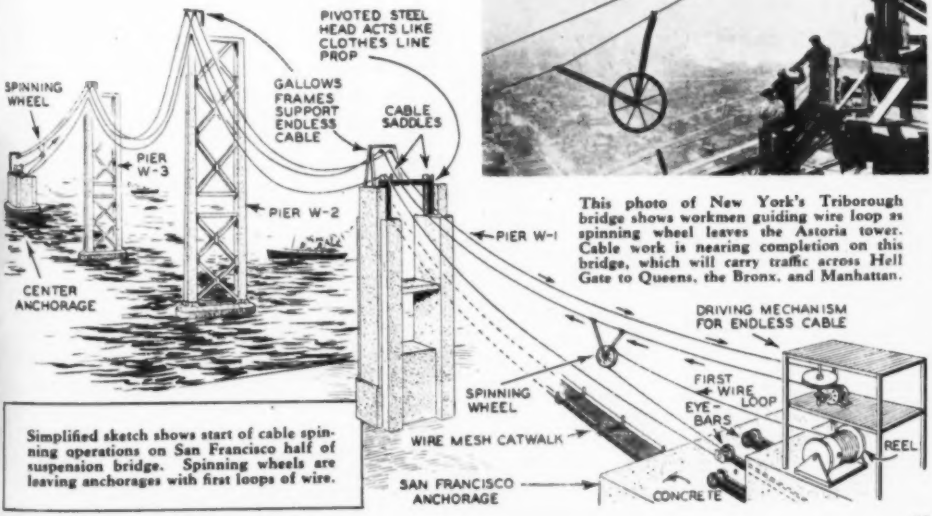
The greatest difference in the two Bay bridge spans lies in the method of constructing the cable roots or anchorages. At Yerba Buena the cables end at eye bars set into a concrete-filled tunnel leading far back into the solid rock of the island. At the San Francisco end, however, a 150-foot high block of concrete resists the cable pull by sheer bulk of weight. At this end, too, is the "clothesline prop"—a short tower of concrete which props up the cables, permitting the anchorage to be set farther back, on more solid ground. The cables on this half of the span are therefore considerably longer.

Before any suspension cables can be formed or spun, it is necessary to build catwalks—aerial sidewalks suspended between the towers a few feet below the final positions of

A view from San Francisco anchorage, showing the catwalk cables in position. Wire mesh walks are bolted to the wires.

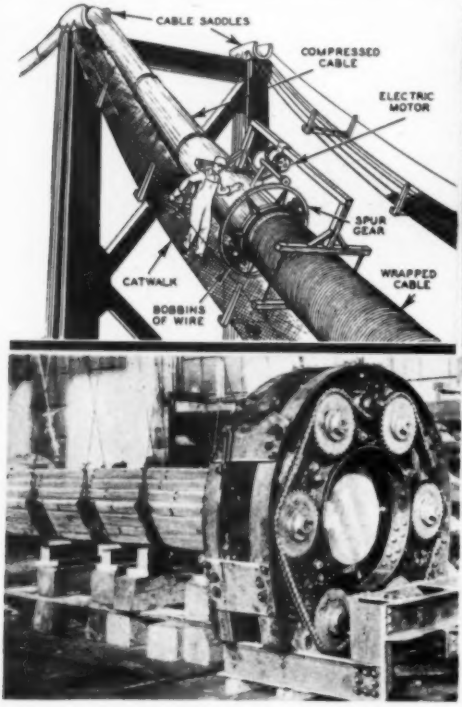


This photo of New York's Triborough bridge shows workmen guiding wire loop as spinning wheel leaves the Astoria tower. Cable work is nearing completion on this bridge, which will carry traffic across Hell Gate to Queens, the Bronx, and Manhattan.

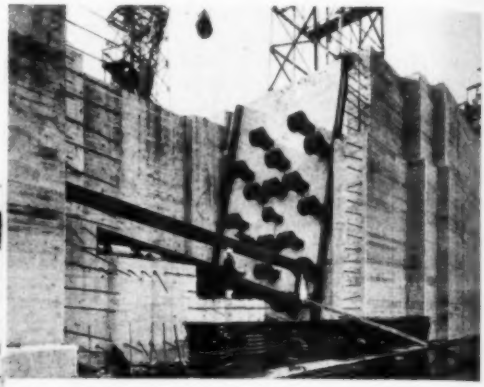


Simplified sketch shows start of cable spinning operations on San Francisco half of suspension bridge. Spinning wheels are leaving anchorages with first loops of wire.

TRAVELING JACK SQUEEZES FINISHED CABLES



The traveling jack which will squeeze 17,664 wires into a compact circular cable is shown here under factory test. A chain drive powered by a compressed air motor forces six 75-ton jacks inward from all sides. Wire bands are placed over compacted cable before machine is moved to new squeezing position. Note how cable is made up of parallel wires grouped in 37 strands which have a hexagonal shape before squeezing.



These steel eyebars, imbedded into solid concrete of San Francisco anchorage, form the roots which resist the 80,000,000 pound pull of the two massive bridge cables. Simplified sketch at upper left illustrates how a protective wire wrapping is placed over the entire length of the completed cable.

the bridge cables. Workmen and inspectors cross the bay on these aerial roadways many months before completion of the bridge proper.

Four steel cables, each 2¼ inches thick, are laid at the bottom of the bay between towers by barges. While water traffic is halted, these cables are hoisted to the tower tops and placed in steel saddles. Each must be adjusted carefully to the required length and sag, corrections being made for wind and temperature as necessary.

On these four cables are laid timber cross beams, a coarse chain link screen, and finally a wire screen with ½-inch square meshes which will catch nuts, bolts, or tools which might be dropped accidentally by workmen. Sections of this walk are assembled on the ground, rolled up for hoisting into position, and bolted to the four cables. The fine mesh screen is turned up on each side of the walk to form a footboard, and a wire cable handrail supported above it.

There are two catwalks for each span, separated by the width of the bridge roadway. At intervals crosswalks are placed between, to provide paths for workmen and to stiffen the flexible screening. Storm cables are then run from points near the foot of each tower to the centers of the catwalks, to lessen sway in high winds. The walks are now ready for the cable spinning operations.

Vertical timber frames resembling gallows are erected over each catwalk to support the two cables of the endless tramway which is to carry the spinning wheels back and forth. This endless cable travels over a horizontal pulley at each anchorage. One pulley is on a shaft which is geared to an electric driving motor, but the other turns freely. One of these tramways is required for each cable. V-shaped hangers which support the traveling spinning wheels are fastened at opposite ends of the endless cable which will carry the wire strands back and forth across spans.

Since the location of the entire cable depends upon the accurary with which these endless guide wires are placed, the final adjusting work is done at night, when all parts of the cable are at a constant temperature. Surveying instruments set up on nearby hills are used to check the sag in each span.

The actual spinning or weaving of the cables is the next step. There are 17,464 galvanized steel wires in each cable, lying parallel and divided into 37 strands of 472 wires each.

[*Continued on page* 133]

Calculating Machine is Built of Toy Parts

CONSTRUCTED entirely from the wheels, gears and structural members of a popular construction toy set, an amazing calculating machine at Manchester University, England can do in a few minutes problems which ordinarily would require many days of tedious work by mathematicians. The only other machine of its kind is at Boston, Mass.

When experiments on this machine have been completed, Mr. A. Porter and Professor Hartree, its builders, propose to make a larger model, 27 feet long and 12 feet wide.

Framework, gears, and shafts of this intricate calculating machine built at Manchester University, England are all taken from a popular construction toy set. Integrating problems are worked out on the turntables in the foreground.

Underground Tides Are Measured

Movements of underground tides are checked constantly at this well. Steel tape is used to calibrate automatic depth recording apparatus which is visible inside the well housing.

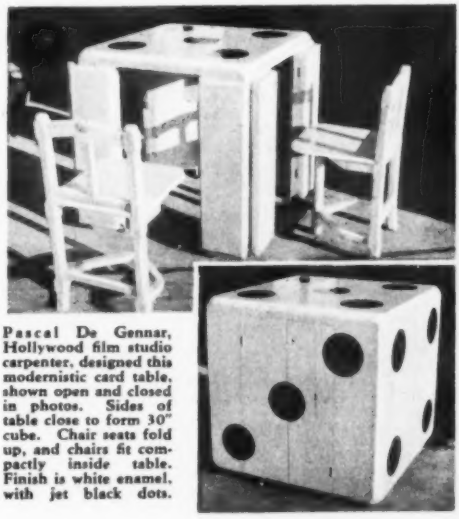
MYSTERIOUS underground tides, ebbing and flowing far beneath dry land, are giving scientists a new puzzle. Twice a day some unknown force causes water in wells throughout the country to rise and fall just as do the ocean tides.

D. A. Lane, engineer of the Los Angeles Water department, has placed sensitive automatic recorders in many wells, to obtain a continuous record of the height of the water surface. Other recorders, installed on piers extending far out into the ocean, revealed that ocean tides occur earlier than do underground tides. Earthquakes thousands of miles away cause erratic surges in ground water levels. Quakes in Tokyo, Japan, have been detected by California water level recorders.

Table Folds Into Giant Die Cube

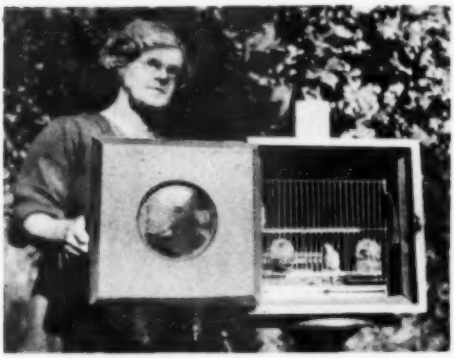
NEWEST in modernistic furniture to be developed in Hollywood is a card table which closes up to form a 2½ foot cube having large black dots like those on dice. Three-legged folding chairs fit compactly underneath the table. Two doors to each side swing outward when the table is in use.

The center black dot in the table top is a loose disc fitted with a flush handle. When removed it reveals three shelves for cards, chips, and score cards.



Pascal De Gennar, Hollywood film studio carpenter, designed this modernistic card table, shown open and closed in photos. Sides of table close to form 30" cube. Chair seats fold up, and chairs fit compactly inside table. Finish is white enamel, with jet black dots.

Phonograph Records Teach Roller Canaries to Whistle Songs



Canaries practice singing of popular songs in this sound-proof booth, held open by Mrs. P. E. McCoy. The circular window has two thicknesses of glass, with air space between.

BY PLAYING the same phonograph record of a song over and over again for young canaries, Mr. and Mrs. P. E. McCoy of San Francisco are able to teach hundreds of roller canaries each year to whistle popular songs. Some of their whistlers have sold for $500.

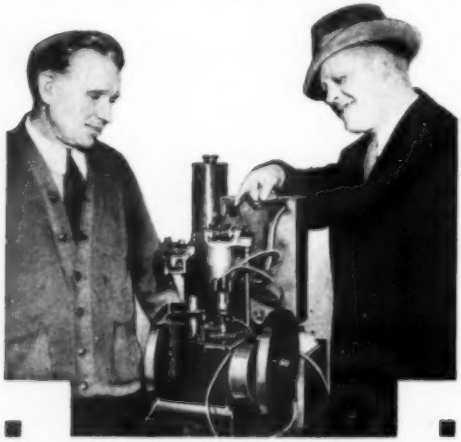
For those birds which cannot imitate songs played by an orchestra, recordings of the song as whistled by a tutor bird are made, and played to the baby birds. This makes it unnecessary to use tutor birds to sing directly to the baby birds, or for McCoy to whistle for hours each day to one bird after another. A special motor-driven device makes the record repeat automatically for a half hour at a time.

After a baby bird has acquired his song, he is placed in a special sound proof box, where he can practice without interference from other warblers. Fresh air enters the box through specially designed mufflers. A dozen or more birds can practice in one room, whereas previously only one bird could be kept in a room.

Valve Stops Monoxide Gas Danger

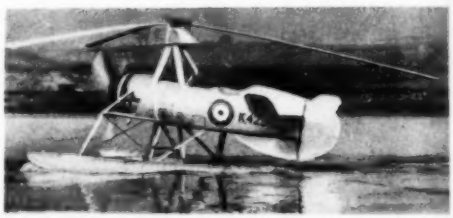
THE elimination of deadly carbon monoxide gas from the exhaust of gasoline engines is just one of the claims made by two Minneapolis inventors, Nels Swenson and Gustav Nyquist, for their perfected rotary valve. The valve is said to make pbssible almost complete combustion of the fuel, giving lower gas consumption, quieter operation, and a much simpler engine construction.

To prove that their engine gave off no deadly gases when equipped with the rotary valve, the two inventors entered a closed room in which the engine was run for several hours.



That spool-like device to which Nels Swenson (right) is pointing is the new rotary valve which he and Gustav Nyquist (left) have perfected after four years of experiment. The valve is turned to four different positions by a rod geared to crankshaft. This one cylinder engine, built especially by the inventors for their experiments, gives low gas consumption.

Newest Autogiro Lands On Water



The autogiro takes to water for first time. Juan de la Cierva is shown here landing on the water near Rochester, England, after a test flight in wingless, pontoon-equipped rotor craft.

A WINGLESS autogiro equipped with pontoons instead of the usual landing wheels was successfully brought down on water near Rochester, England by Juan de la Cierva, Spanish inventor of rotor aircraft. This is the first time that a C.30 Autogiro has been used with floats.

Since very little room is required for takeoff purposes with this latest model, any small lake or crowded harbor is suitable for a landing. According to de la Cierva, the ship will be able to jump over small boats and other water obstructions after a run of only a few yards. While jumps of as high as 100 feet are theoretically possible with the craft, he believes an initial height of 20 feet after takeoff is the maximum that will be required.

MOTORLESS WASHER
Among Newest Household Robots

DOUBLE-DECK TWIN BEDS have interchangeable side rails and end boards, permitting use of beds side by side or one above the other. In making up the double-decker shown above, both head-boards are used on the bottom bed, and extensions added to the legs of the upper to give more headroom.

MOTORLESS WASHER cleans clothes in less than five minutes. An agitator plate inside swings back and forth as hand-operated lever is moved with slow, easy strokes.

ALL-PURPOSE COOKER plugs into light socket, does any type of cooking or baking. Shown below are the broiling and baking pans, waffle grids, muffin tin, and oven which fit into chromium-finished unit.

KITCHEN ROBOT pictured above can, at touch of button, make ice cream, wash cutlery, mix cake batter, mash potatoes, squeeze or mash fruit, grind meat, and do a host of other tasks about kitchen.

The 1935 Scrap

More than a hundred million dollars worth of old gold in the form of jewelry and antiques has been turned back into the United States treasury at a price of $35 an ounce.

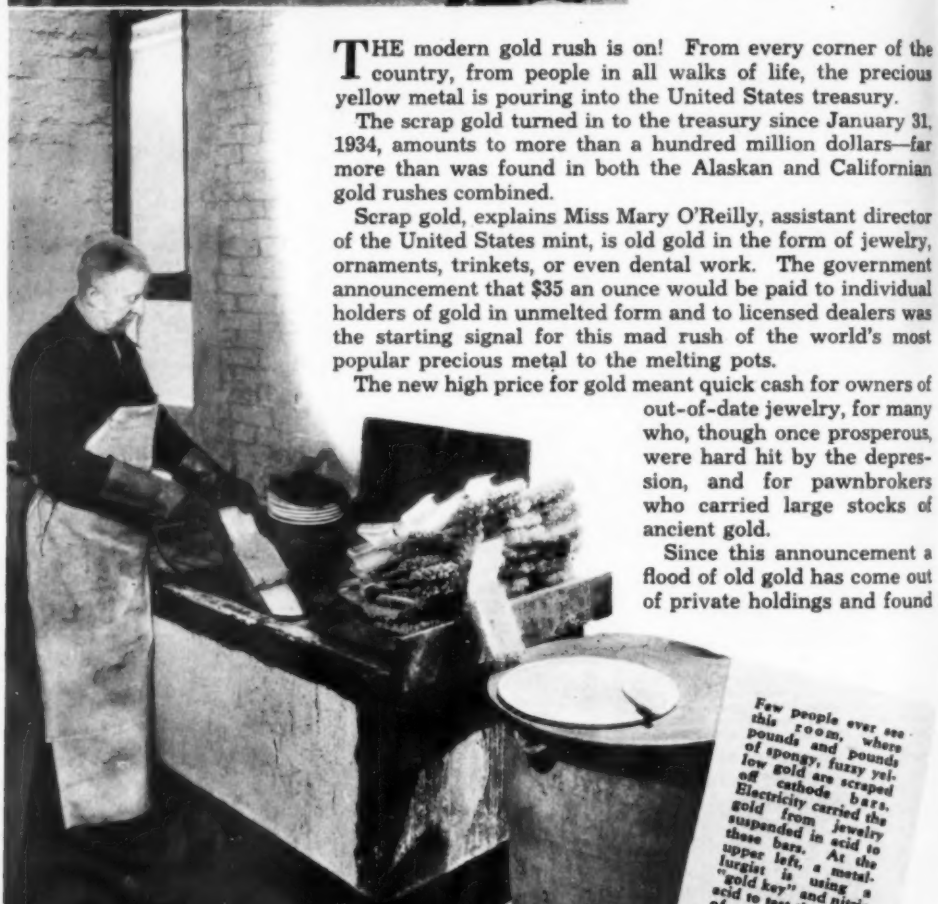
THE modern gold rush is on! From every corner of the country, from people in all walks of life, the precious yellow metal is pouring into the United States treasury.

The scrap gold turned in to the treasury since January 31, 1934, amounts to more than a hundred million dollars—far more than was found in both the Alaskan and Californian gold rushes combined.

Scrap gold, explains Miss Mary O'Reilly, assistant director of the United States mint, is old gold in the form of jewelry, ornaments, trinkets, or even dental work. The government announcement that $35 an ounce would be paid to individual holders of gold in unmelted form and to licensed dealers was the starting signal for this mad rush of the world's most popular precious metal to the melting pots.

The new high price for gold meant quick cash for owners of out-of-date jewelry, for many who, though once prosperous, were hard hit by the depression, and for pawnbrokers who carried large stocks of ancient gold.

Since this announcement a flood of old gold has come out of private holdings and found



Few people ever see this room, where pounds and pounds of spongy, fuzzy yellow gold are scraped off cathode bars. Electricity carried the gold from jewelry suspended in acid to these bars. At the upper left, a metallurgist is using a "gold key" and nitric acid to test the purity of gold in scrap jewelry just bought.

Gold RUSH

by
JAMES NEVIN
MILLER

There is about $3,000 worth of scrap gold in the collection of wedding rings, watch cases, and necklaces shown above, which was sold to licensed gold dealers for remelting. The Russian dinner piece and heart-shaped mirror at left proved to be of brass, with only a very thin covering of gold.

its way to the mints and assay offices where it is weighed, its value judged, payment made to sellers and the metal refined. Customarily all this takes place within a week or ten days, if deposits are made by mail, and even quicker if by person.

Old watches lead the list of scrap gold, followed closely by wedding rings, brooches, toilet sets, ornamental mirrors, fraternity emblems and shoe buckles. Even baby pins and snuff boxes reach treasury melting pots!

Dealers have been advertising on a large scale for old jewelry. Dentists have been gathering together all the dental scrap they can find. Junkmen are scurrying from house to house, buying in as many trinkets as they can.

To one New York dealer went a man who slipped a pair of dental plates out of his mouth and asked how much he could get for them.

"I'll have to scratch them."

"O. K.," said the man.

The dealer made a notch in both plates and applied nitric acid. Tell-tale green stains formed. He handed back the plates. "I'm sorry," he said. "These are brass with thin gold plates."

The owner re-installed the plates the better to express his indignation. "They ought to be gold; they cost me $200. Guess the only thing left for me is to go back and bite my dentist with them."

Most sellers have an exaggerated idea of values. This is particularly true of foreigners. In New York the other day an Italian woman brought in an ounce of gold jewelry and said she wanted $35 for it. The dealer's test showed that it averaged 14 karats; for this grade the day's price was 91 cents per pennyweight or $18.20. He pointed out that the gold wasn't pure, and that there were refinery charges. The woman grabbed up the jewelry and stalked out, muttering angrily about police.

Don't get the idea that all jewelers in grandpa's day were honest. A common trick, from Civil War times on through the eighties was to make imposing "solid gold" watch cases and stamp them 14 karats. Actually only a thin layer on the outside was 14 karats; the rest of the case was 10 karats or even less.

Sad to say, owners of "valuable" heirlooms are registering extreme annoyance these days. Often they breeze into a Government assay office with gold-plated trinkets—perhaps much prized family possessions for a generation or so—which they fondly imagine are solid, and express indignation when Federal experts turn down their gold.

But there's another side of the picture. Recently in New York a man presented a

ELECTRICITY SEPARATES GOLD from OTHER METALS

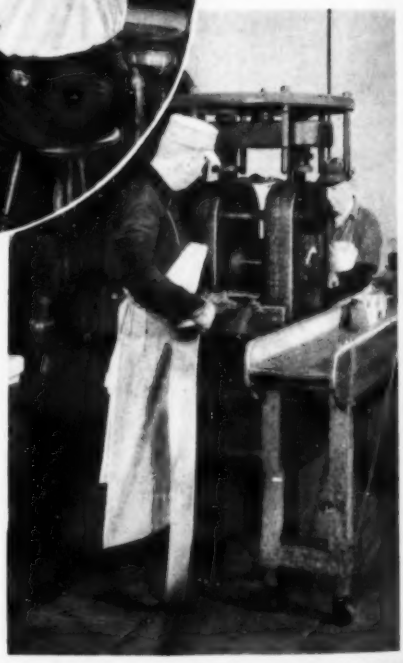
Above is a scene in the electroplating room of the Federal refinery. Bars of impure gold are supported in an acid bath, and connected to the positive terminal of a d.c. generator. By electrochemical action the gold is carried through the solution and deposited on pure gold cathodes. Impure metals fall to the bottom of the tank. The mask protects the workman from acid fumes.

an ex-police commissioner; and the other was a solid gold engraved pass, good for a box in any Shubert theatre in the United States at any time. The pass was made out to a close friend of the Shuberts and to their heirs forever!

Outstanding among family heirloom oddities turned in for cash to Washington, D. C., dealers was an elaborately decorated, heart-shaped mirror, ostensibly devised for use at milady's dressing table. This was generously covered with coy cupids frolicking about with enormous bows and arrows and cheerful cherubs playing the harp. Close examination revealed that the heirloom was a "phony" —made of brass with an ingeniously devised covering of gold plate heavy enough to trick the eye but

[*Continued on page* 132]

In circle: Scales so delicate that they will give the precise weight of a pencil mark are used in the Federal assay office to weigh old gold which has been sent in for redemption by people in all parts of the country. Pure gold is handled much like any other metal at the Federal refinery. Below ribbons of gold are being passed between heavy rollers which reduce thickness.



combination gold plated cigaret lighter and gold watch at the office of the city's biggest licensed dealer.

"This originally cost $450,000," he claimed. He added that his broker gave it to him in 1928 when the "sky was the limit." However, before the market crash had ended he had lost $450,000 through that selfsame broker.

The other day Assistant Director O'Reilly of the mint received a cup symbolic of winning the Kentucky Derby. She refused to disclose the date on the cup, for that knowledge would hint at the owner's identity.

One big New York dealer reported two peculiar chunks of old gold sent in by folks once prominent but now impoverished. One was the gold badge of

Hotel Guests DIAL for Radio Programs

This radio room, containing greatest all-wave receiving and program distributing system in world, is in Waldorf-Astoria Hotel. Panel at extreme right holds receiving equipment.

Each room has a modern loudspeaker with dials permitting a choice of six foreign or local programs. Some rooms have the dialing system shown at right, which offers a much greater variety of programs. Equipment cost nearly a million dollars.

HOMESICK foreign guests at New York City's Waldorf-Astoria hotel can now listen to radio programs from their own country, or perhaps even from their home town. At their service is the greatest all-wave radio receiver in the world—a set which can bring to each of the 2,200 suites of rooms programs from any one of the powerful broadcasting stations in the world. These programs are oftentimes heard with the same volume and clarity as are local stations.

Some rooms have a unique dialing system, which permits guests to select any station they desire from a printed daily list of world-wide broadcasts, or even hear their favorite phonograph records. In other rooms there are controls on the modernistic loudspeaker, which give to guests a choice of six broadcasts. Amplifiers build up the strength of weak signals more than a hundred billion times.

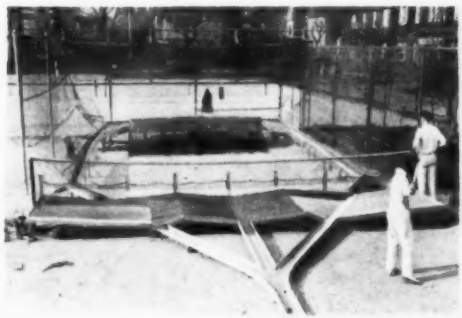
Radium Tests Pipes At Boulder Dam

FIFTY thousand dollars worth of radium was used to test welded joints in the giant steel pipes which will carry the waters of Boulder Dam to the power plant turbines. Photographic film was fastened over the joints on the outside, and the radium placed inside the pipes. The highly penetrating rays recorded on the film any air pockets or cracks.

Practice Tennis On One-Man Court

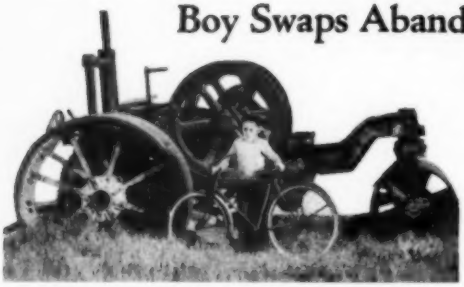
AT HARVARD COLLEGE is a one-man tennis court which returns served balls to the player from any part of the court. Invented by George Kendall of Peterboro, N. H., the special court is used daily by tennis coaches for instructions in serving.

A system of inclined nets guides bouncing balls into wood troughs sloping down to the feet of the player. Serves hit a screen extending up from the net, then fall back into the return system.



There are no balls to chase when practicing tennis serves in this one-man court. Nets and inclined troughs return all balls by gravity to serving position. Only half of court is used.

Boy Swaps Abandoned Steam Roller for Bicycle



Donald Johnston swapped this steam roller for the bicycle.

ELEVEN-YEAR-OLD Donald Johnston of Albany, Oregon had no money, but wanted a bicycle. A steam roller had stood unused on a vacant lot near his home for years. Thinking he might be able to do work in exchange for the tons of scrap iron, Donald visited the owner. Then came a surprise—the owner made a present of the roller to the youth.

Visiting all the second-hand stores in town, Donald finally found a bicycle that suited him, and swapped it for the steam roller. Thus did initiative and perseverance—or possibly steam roller tactics—bring a bicycle.

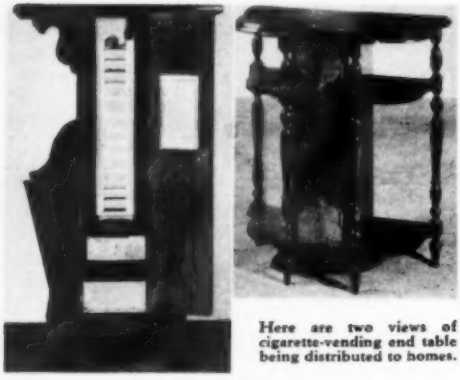
"Thinking" Brain Removed

LIKE a fairy tale of medicine is the description of an operation which removed nearly the entire "thinking" portion of a woman's brain, changing her entire personality. For the first year after the operation the woman was almost childishly gay and happy. Later came more mature changes, which improved her power of concentration, memory, and endurance. The right prefrontal lobe and most of the left lobe of the brain were removed by Dr. Glen Spurling of Louisville University's School of Medicine.

Machine Sells Cigarettes In Home

COIN-IN-THE-SLOT cigarette vending machines built into attractive pieces of furniture are now being placed in American homes. Already twenty thousand of these venders, built into magazine stands and end tables of six different models, have been distributed to home owners.

Machines vending other articles are now being planned. It is intended to make the furniture pieces so attractive that housewives will welcome their placing in the home. Machines are refilled regularly and money collected by agents of the manufacturer.



Here are two views of cigarette-vending end table being distributed to homes.

Novel Piano Plays Violin Solos

James L. Warner plays the combination piano-violin which he invented. Both instruments are played with same keyboard; speed control of violin motor is operated by knee.

A MOTOR-DRIVEN violin controlled by a piano keyboard, the invention of J. L. Warner of Tulsa, Okla., plays both piano and violin selections at the same time. Beneath the piano is an electric motor belted to a rosin-covered roller. Fishlines stretched tightly between each of the piano strings and the corresponding key are forced against the roller as the piano is played, to create the violin notes. The volume of the violin tones is increased by speeding up the roller which serves as "bow." Since the violin strings are directly connected to the piano strings, both piano and violin notes are amplified by the same sounding board.

Your MICROSCOPE Will Tell Whether INSECTS HAVE EARS

This beautiful butterfly, found in Indo-China, has organs of hearing on both sides of the body. Arrow points to portion of skin forming ear drum.

The long, oval organs of hearing are on the shins of both forefeet of this New Guinea grasshopper.

At the base of the body on both sides are the ears of *Lamarackiana Lobosceliа*, a field grasshopper found in East Africa, and pictured above. At the right is *Diophanes Salvifolia*, a common grasshopper in Central America, which has in its forelegs covered ear drums consisting of only two narrow skin slits.

DOES a butterfly have ears? Where are the ear drums of a grasshopper? Do those insects which make no sounds have organs of hearing?

Your own microscope can give the answers to these interesting questions—but don't hunt for the ears of these insects near their heads. Man and all the higher vertebrates may have organs of hearing near their organs of sight and smell, but not so with these tinier creatures of the universe.

Grasshoppers possess well-developed organs of hearing, or ears, the location of which varies with different species.

Let us take as an example the porch grasshopper, belonging to one of the groups that are able to hear. We find near the knee, on the shins of both forelegs, a long, oval, rather sunken-in bit of skin, which represents the ear drum. This membrane is sometimes farther back into the legs, and protected by horny white chitin pads which cross over to leave only a narrow slit at the skin surface.

In the case of the field grasshopper, the rear portion of the body rather than the forelegs has the organs of hearing. We can see clearly with our low-power microscope a little circular bit of skin on both sides of the body. This is the ear drum. The inner construction of the ear is much like that of humans, the vibrations of the drum being transferred to an auditory nerve by thicknesses of chitin in a unique form.

Since some insects which do not chirp have well developed ear drums, it was thought for

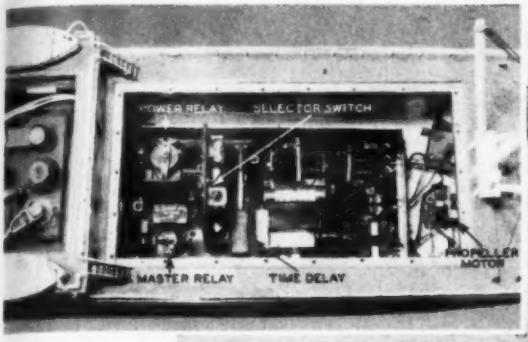
[*Continued on page* 130]

20 Thunderstorm DON'TS

DON'T TOUCH IRON FENCES
DON'T SIT IN FRONT OF OPEN FIREPLACES
DON'T PARK OR STAND UNDER TREES
DON'T STAND UNDER POWER LINES OR NEAR HYDRANTS
KEEP OFF THE WATER
DON'T HANDLE ELECTRIC APPLIANCES
AVOID STANDING NEAR HIGH PLACES
DON'T WALK ON RAILROAD TRACKS
DON'T TOUCH FAUCETS OR PIPES
DON'T CARRY STEEL GOLF CLUBS
DON'T STAND IN OPEN DOORWAYS

Lightning follows a path of least resistance in its mad rush from storm clouds to ground, leaving behind a scorching death. In the open country, where there are no metal roofs or steel structures to sidetrack lightning, casualties and fires are common. When a thunderstorm is in progress, don't use rural telephones except in an emergency. Don't sit near a stove or other large metal object. Don't sit under electrical fixtures such as chandeliers. Don't touch any wires, even though disconnected—they may carry static charges. Don't sit near open windows—lightning sometimes follows warm air currents. Don't touch pumps or windmills. Don't linger near lightning rod wires. Don't handle metal fishing rods. Don't fly kites.

Model Steamer, Operated Remotely, Obeys Radio Directions



Felix LaVallee, 24-year-old Minnesota farmer, is shown bringing his radio-controlled model steamer to shore. Boat was built from odds and ends after two years of leisure-time work, $100 being spent for equipment and parts. Inset shows the robot pilot of "Radio Lady." Note storage battery at left.

A RADIO-CONTROLLED model steamship five feet long, which can be started, stopped, reversed, or steered from shore simply by pressing the key of a radio transmitter, is the result of two years of spare time work by Felix LaVallee, a farm youth living near Hugo, Minn. No plans being available, LaVallee designed his own control mechanism for "Radio Lady," even converted half a dozen doorbells into relays.

A four-tube, five-meter transmitter on shore sends out signals each time the sending key is pressed. A four-tube radio receiver mounted inside the boat hull, and operating from a storage battery, picks up and amplifies these signals, then sends them through relays which operate a time delay switch and a simple homemade selector switch.

Three taps on the sending key means "full speed ahead" to the robot pilot; four and five taps give other speeds or control steering. A time delay relay slows up the selector switch until all of the signals have been received. One motor steers, another propels the boat.

Mired Truck Tows Self from Mud

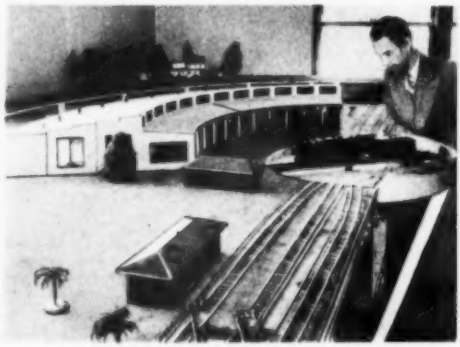
The above-pictured truck towed itself out of the swamp when other rescue methods failed. A rope was tied to a nearby tree and a winch on the truck geared to the drive shaft. The racing engine pulled the truck free.

NEAR an oil field in Hanover, Germany, a huge truck became mired in a swamp. Rescue seemed impossible since smaller cars also sank in the muck.

Finally, the truck driver decided to pull his vehicle out of the bog under its own power. By tying a strong rope to a tree directly ahead of the truck and running the other end of the rope to a winch attached to the motor drive shaft, the racing engine virtually towed the truck forward to dry, solid land.

As the rope was taken up on the drum of the winch, the truck, more mobile than the tree, was taken in tow.

20 Model Locomotives Roar Over Tracks of $50,000 Railway



Milton Cronkhite of San Marino, Calif., pilots one of his 20 homemade locomotives out of a midget roundhouse. Twenty years were required to build the complete system.

A MINIATURE railroad system, consisting of 20 locomotives and more than 2,000 feet of track, is the pride of Milton Cronkhite, hobbyist of San Marino, Calif.

Expert workmanship is found in all of his trains which, modeled after Santa Fe railway equipment are accurately scaled. The cost of trains, equipment and the rest of his rolling stock is estimated at $50,000. More than 20 years were required to complete the system.

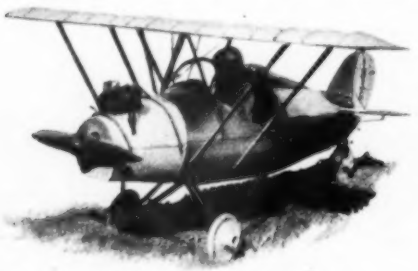
In addition to locomotive-building, Cronkhite constructed the miniature equipment and regulation roundhouse shown at the left.

Tiny Motor Drives Street Plane

CRUISING about at a land speed of 10 m.p.h., eight-year-old Georgia Williams of Chelsea, Mo., gets all the thrills of a real aviatrix as she flashes through town in a one-cylinder monoplane constructed by her uncle, Rolland Williams, restaurant owner.

The plane, a minute model of the early Lockheed Scout, is powered by a motorcycle engine which twirls the propeller to develop a top speed of 10 m.p.h.—a speed low enough to keep the plane on the ground.

The fuselage consists of a light wooden frame covered with canvas to which is attached an eight-foot wing and a landing gear made of three salvaged coaster wagon wheels. Guiding vanes in the rear control the direction as the pilot moves the joy stick in the cushioned cockpit set just behind the wing. Wheels and wings are detachable for winter storage. The whirling propeller, dangerous in the event of a collision with anyone, makes necessary the use of a guard screen when the tiny plane is run on the street or sidewalk.



Little Georgia Williams, 8, is seen cruising around in Chelsea, Mo., with a workshop-built model of an early Lockheed Scout. Power is provided by a motorcycle engine.

Voltage Control Is Flickerless

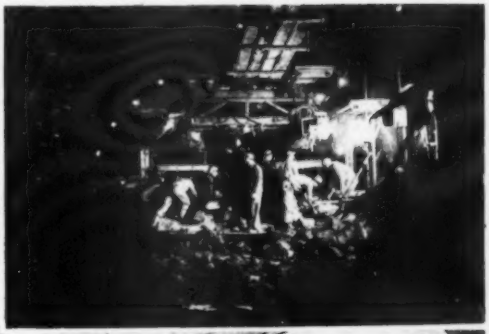
Inventor L. J. Beindorf operates the voltage control cabinet which he claims will eliminate jumpiness apparent in ordinary rheostats. The device is especially useful for lighting or dimming theater lights for special illumination of scenes.

A NEW type voltage control, which eliminates the jumping usually apparent with a rheostat, is particularly effective when used for dimming stage lights without flickering.

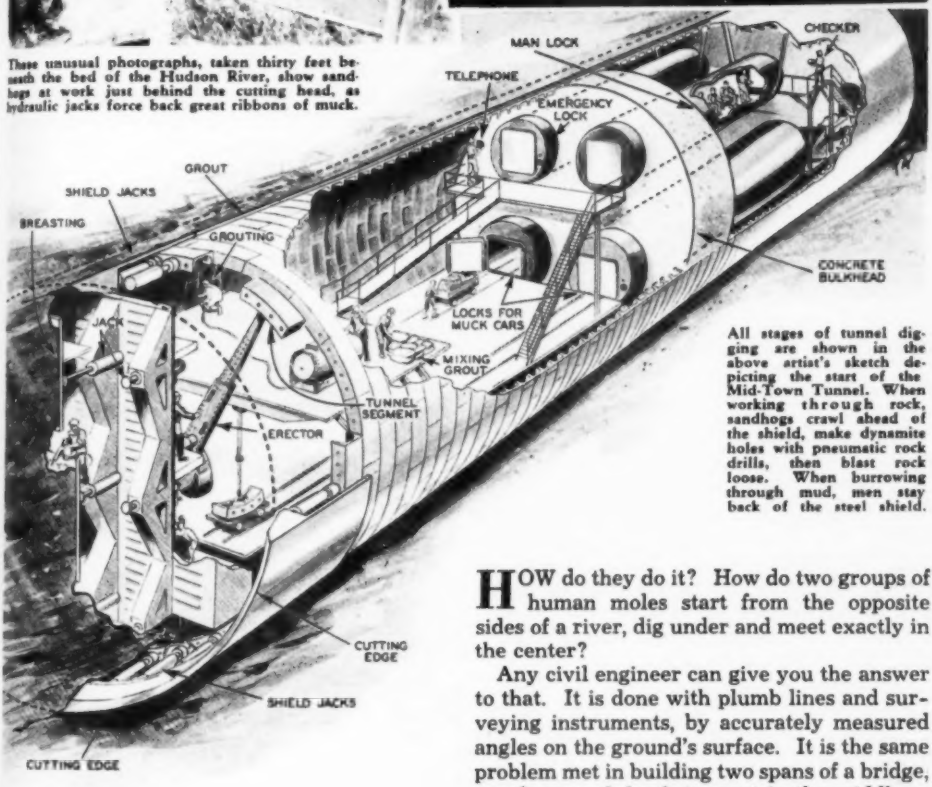
The device is simple, consisting of a motor, commutator and a set of brushes which, when moved, control the current. The inventor, L. J. Beindorf of Chicago, predicts that his new development will revolutionize the control of all motors and lighting.

For perfectly calibrated light transfers and diffusions, as in stage magic and mystery sets, the regulator is said to be well adapted.

How SANDHOGS Tunnel Under Rivers



These unusual photographs, taken thirty feet beneath the bed of the Hudson River, show sandhogs at work just behind the cutting head, as hydraulic jacks force back great ribbons of muck.



All stages of tunnel digging are shown in the above artist's sketch depicting the start of the Mid-Town Tunnel. When working through rock, sandhogs crawl ahead of the shield, make dynamite holes with pneumatic rock drills, then blast rock loose. When burrowing through mud, men stay back of the steel shield.

HOW do they do it? How do two groups of human moles start from the opposite sides of a river, dig under and meet exactly in the center?

Any civil engineer can give you the answer to that. It is done with plumb lines and surveying instruments, by accurately measured angles on the ground's surface. It is the same problem met in building two spans of a bridge, one from each bank to meet in the middle.

The real wonder is: How do men cut through the earth's bowels and shore up the excavation against enormous pressure from the river above?

The answer is: *The Shield Method of tunnel boring.*

Imagine a titanic steel cylinder, thirty-two feet in diameter, sharpened all around on the forward side, and weighing almost 400 tons.

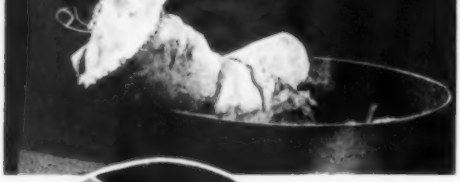
[*Continued on page* 124]

A $37,000,000 TUNNEL

Once more sandhog crews burrow under the Hudson River, to drive New York City's new $37,000,000 Mid-Town Tunnel, another motor traffic highway connecting Manhattan Island and New Jersey. Working in two three-hour shifts a day for high wages, these sandhogs push the cutting head forward five hard-gained feet every twenty-four hours through the solid rock under the bed of the Hudson. In soft muck much greater speeds are made by tunnel crews.

Packing Drive into

Balata, made from the same fluid which forms the chewing gum base, is used for golf ball coverings. It is imported from the far-off Guianas in crude, brown-colored slabs.



Above— Chemically-cleaned balata is purefied and whitened after its alcohol bath. Left—After leaving forming machines, the solid tubular material is snipped and pressed in cup-shaped molds.

Right—Resiliency and flight of ball depend on the core. Hard and soft plastic rubber centers are employed. One firm packs centers in dry ice to better golfers' distance drives.

IT WAS born in the tropics, milked out of a tree, frozen solid under a temperature of 114 degrees below zero and wrapped in hundreds of yards of rubber before being committed to an armored covering.

And then it was molded under 3,000 pounds pressure to the square inch, pressed under a 300-pound weight, and shot out on a test flight through space.

Small wonder, with this kind of training, that the modern golf ball stands up under vicious play on the courses.

Somewhat astounding economic adventures have befallen the golf ball since the first one, a leather case stuffed with feathers, was manufactured in St. Andrews, Scotland, 150 years ago. Fifty years later the gutta percha ball appeared. Then a series of developments led to the scientific and highly-finished product of today.

Every golf ball has three parts—center, wrappings and cover. This triple separation did not always exist. Feathers, solid gutta percha, air and liquid have been tried as cores upon which to build better flight, resiliency and distance.

The 1.68″ diameter has remained unchanged. Dimples, or outer cover markings, were adopted by accident. Early use of the solid ball led to the puzzling discovery that an old, battered ball had a longer flight than a new ball.

Some ingenious golfer eventually plumbed this mystery. He took a new ball, hammered the cover with a sharp instrument until it resembled an old ball which had been sliced and slashed by a club, and then swatted the ball over the course.

Today, the markings on the cover of a golf ball are put there not for ornament but for

GOLF ODDITIES

The United States boasts of 1,500,000 active players who spend $20,000,000 yearly for golf equipment —a sum sufficient to buy a battleship!

There are 5,728 golf courses in all, occupying an area of 464,000 acres and valued at $830,000,000, or an equivalent expenditure of $6.50 for every man, woman and child in the United States.

1,500,000 dozen golf balls and 100,000,000 wooden tees are manufactured and used yearly by golf fans. Each player uses a dozen balls per year.

Allowing one-sixth of a second per stroke, only 15 seconds of actual golfing is done in rounding an 18-hole course.

A properly hit golf ball will attain a speed of 115 m. p. h.

the Modern Golf Ball

by WILLIAM H. MARKS

use. The markings furnish air pockets to assist the ball to climb in flight. For many years, every new golf ball that went out of a factory looked as though it had already been hammered by an army of duffers.

There is a romance of economic exploration and factory engineering in the cover of the modern ball. The finished product is hard, white and pitted. Yet the raw material —belata—comes to American factories from the far-off Guianas in half-inch slabs, brown in color and flint-like in texture.

Belata is made from a viscous fluid from the tropical bullet tree. From the same fluid comes the chicle that forms the base of chewing gum.

In the golf factory, belata goes through a chemical cleaning process from which it emerges pure white in soft dry slabs. All the natural color and resinous matter has been removed. Fed into the forming machines, the belata comes out in solid tubular form and is snipped off by scissors into molds containing three dozen cups.

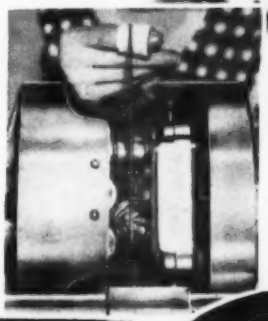
Then comes the first big squeeze to harden the cover against the vicious clout of the golf club. Under hydraulic pressure of 3,000 pounds to the square inch, the belata is shaped into cups. These cups later receive the rubber core, to which the cover is welded by a mechanical embrace of similar pressure. The second mold also impresses the markings on the cover.

It is in the core that modern manufacturers have expended unlimited energy and expense, for the resiliency and flight of the ball depend on what lays under the cover.

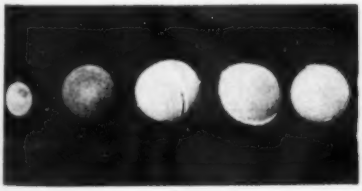
Various methods were tried to

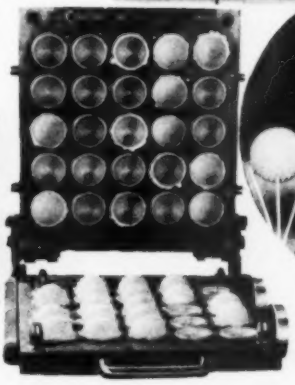
[*Continued on page* 122]

You tee it off, swing at it, chase it around, but do you know how the golf ball is made? Pictured here is Richard Arlen, film star, one of the thousands of American devotees of the game of golf.



Left—Interior view of the tape winder. Note rollers on which core rotates to receive hundreds of yards of stretched rubber tape before being confined to its armor-like coat. To test quality of ball unwind core. Twisted and tangled tape indicates poor quality.





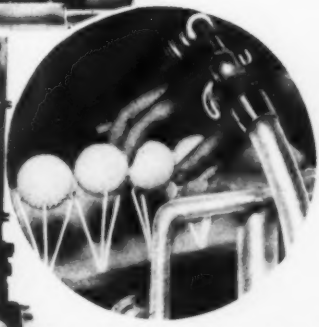


Photo above shows various stages in the manufacture of a golf ball, starting with rubber core, winding, covering, pressing and spraying.

Left—The cover is pock-marked and squeezed on the core under 3,000 pounds of pressure. Above —Spray-painting exterior of ball.

Boys Lay YACHT Anchors to Earn Living

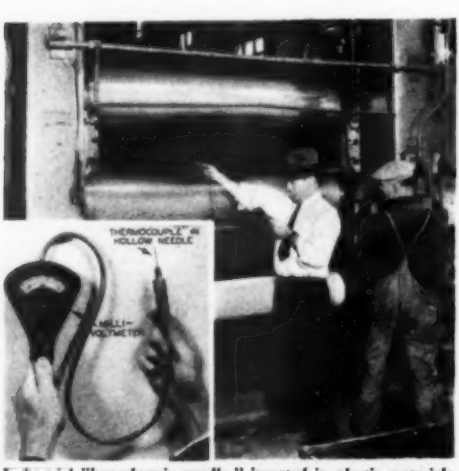
Dave Foster and Frank Quinn of California are seen operating their homemade anchor-pulling craft

TWO Santa Monica college youths are earning a livelihood from Californian yachtsmen by laying anchors on the floor of the harbor. To carry on their work, they have constructed a homemade catamaran anchor puller. Having a five-foot beam, the 18-foot craft is propelled by an outboard motor to speed the boys from one location to another. The oarsman holds the boat directly over the anchor while his partner operates the hoist.

Needle Detects Heat in Material

TO RECORD the temperatures of plastic materials during manufacturing processes, industry has introduced the principle of the hypodermic needle. Any temperature ranging from 50 to 400 degrees Fahrenheit is indicated immediately on the scale when the needle is thrust into the material tested.

The instrument operates on the principle that when two wires of different metals form a closed circuit and one junction is heated, a voltage is set up which is dependent on the difference in the temperatures of the hot junction in the needle and the cold junction in the meter. This voltage is measured by a sensitive millivoltmeter which is calibrated to read directly in degrees Fahrenheit.



Industrial "hypodermic needle," inserted in plastic materials, reveals temperature at glance in degrees Fahrenheit. Inset—Closeup of the needle, connecting cable, and millivoltmeter.

Bedridden Play Extension Piano

Piano playing for the bedridden is now possible by the invention of a new instrument which folds down over bed. The piano was exhibited recently at a London industrial fair.

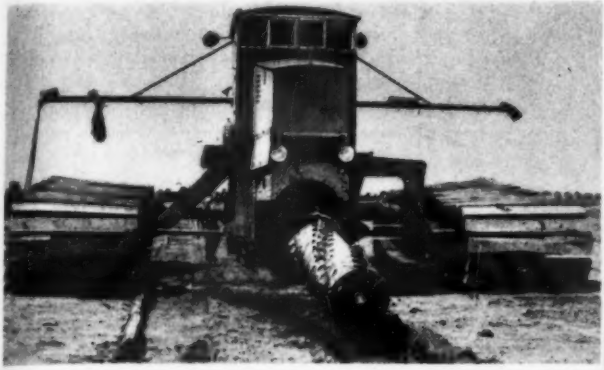
PIANO playing by the bedridden is now made possible by the recent development of an instrument which, wheeled easily about the room, folds down into the patient's lap.

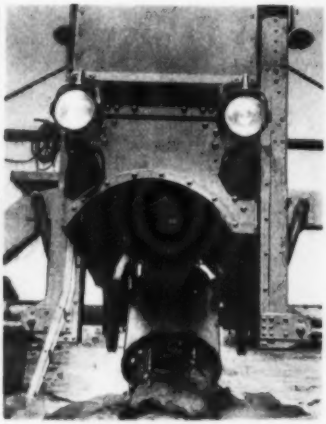
The piano is set up at the foot of the bed and the entire top and front of the instrument is let down over the bed itself. The keyboard is adjustable to almost any angle so that the invalid can practice or play without showing any undue strain.

Blackest Blizzard Hits Bagdad

WHAT is believed to have been the world's worst dust storm, which literally moved entire farms from one spot to another, recently swept down upon the city of Bagdad, burying city streets and suspending business for hours. Ten times more terrific than any of America's "black blizzards," the Bagdad plague dropped 2,300 tons of dust particles over every square mile. Scientists account for the world-wide dust storms by the freakish presence of unusual windy weather.

Giant Machine Burrows Into Subsoil to Reclaim Barren Land





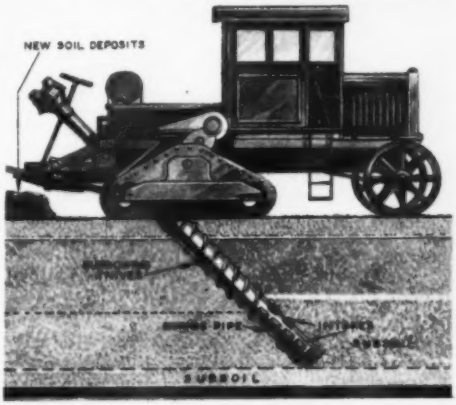
This subsoil lifting machine draws up valuable subterranean deposits, spreading fresh soil over surface to stimulate farming on once-abandoned areas.

BURROWING deep into the subsoil, a newly-developed machine is today converting Germany's barren, drought-stricken regions into productive areas for farming.

Rolling like a war tank over marshlands and non-fertile acres, the mechanical earth-borer lifts the valuable subsoil, scattering it over the surface to provide fresh layers of dirt for crop-raising.

Invented by two German engineers, the machine consists of a revolving pipe, 10 to 30 feet in length, provided with pocket-like knives and intake openings. As the apparatus moves forward on its caterpillar wheels, knives projecting from the lower end of the revolving pipe "bite" into subsoil which is conveyed to the surface and widely scattered. Burrow knives in the upper part of the pipe move the intermediate layer of soil horizontally to the rear. The machine has a speed of three to six feet per minute and a lifting capacity of 36 cubic feet per lineal yard. The ditch left behind disappears after plowing.

The machine also is employed in constructing roads through swamps. It rips open the surface of the march into long ditches which are ultimately drained and filled with sand.



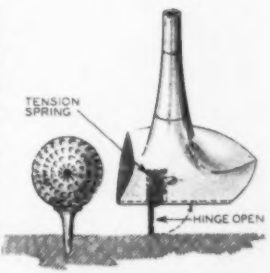
Top—Closeup of boring pipe. Intake pockets in pipe collect valuable subsoil as machine moves forward at speed of 3 to 6 feet per minute. As a result, marshy areas and barren regions become agriculturally productive. Lower sketch shows working parts of subsoil lifter while actually in operation.

"Hour Glass" Tells Span of Life

THE life span of an individual can be revealed with uncanny accuracy by a novel "hour glass" developed after years of research by Dr. Felix Bernstein, German scientist. Functioning like the speedometer and fuel gauge of an auto, the new apparatus recently foretold the life expectancy of 2,500 German subjects who died at the calculated time.

Gauge Reduces Dubbed Golf Shots

A NEW device fastens to any golf club, gauging the height of the driver from the ground at the start of the back swing and reducing misses. On dubbed shots gauge folds up. When closed, distance gauge resembles facing.



Hinge, when open, reveals proper distance of club from ground, thus insuring better drives and fewer misses. Dubbed shot shuts gauge.

Woman's Toothache Yields Perfectly Formed Molar Pearl

Dr. P. Clarence Tennis, California dentist, exhibits pearl-bearing tooth shortly after he extracted it from this surprised patient. Misplaced enamel cell caused the odd growth on tooth.

NATURE recently played an odd prank on Mrs. Wall Wilson, of Beverly Hills, Calif. Suffering from a bad toothache, she called upon her dentist who, after examining the molar, advised that it must be pulled out at once.

A peculiar glint on the surface of the extracted tooth caught the dentist's attention. He examined the molar more carefully.

On the side of the tooth a tiny pearl, perfectly formed, had begun to develop. A misplaced enamel cell was explained as a possible cause. A pearl growing in human mouths is claimed to be a rare occurrence in dental history.

Flexible Shaft Has Varied Uses

A HEAVY duty flexible shaft and a 2 h.p. gasoline engine are now available for driving a wide variety of portable and stationery tools and machines. The universal shaft allows the tools to be held in numerous positions while the power unit remains in one position on the ground.

Several conventional tools can be operated with the unit by merely making a few slight changes. In addition, the manufacturer offers several specially designed accessories to work on the shaft, such as circular saw, airplane starter, concrete vibrator, polisher and brush cleaner. For airplane starting, the unit is mounted on a rubber-tired wheelbarrow which can be moved about on the field.

Above—Flexible shaft and gas engine unit is shown with one of several attachments for varied uses. The device can be used as concrete vibrator, polisher, brush cleaner and (at left) for operating adjustable circular saw.

Ironing Board Folds Into Table

John Cope, California inventor, is seen above with his combination table and ironing board. One table leaf is hinged to fold back to convert table into handy ironer.

A COMBINATION breakfast table and ironing board is the last word in home furniture designed for use in small kitchens.

Perfected by John Cope, Santa Ana, Calif., inventor, the new aid for housewives is small and compact. When not used as a table, it can be converted into an ironing board by a twist of the wrist.

The middle leaf of the table is hinged to fold back, thus allowing the cloth-wrapped board to be raised and put into use.

Pound of Cotton Reaches Around Equator

Says Nic Sprank in Oddities of Science

THE HUMAN BREATH CAN FREEZE WATER! *Place a small test tube containing half an inch of water in a glass half full of ether. Insert a glass tube in the ether, blowing steadily through it for several minutes. Evaporation of the ether will cause the water to freeze.—Chas. Powell, Clinton, N.C.*

ONE POUND OF COTTON MAKES 33,202 MILES OF THREAD! —*When made into thread, one pound of cotton will reach one and one-third times around the equator. The equator is 24,902 miles in length.* — *Lt. Don Benn Owens, Jr., Dayton, Ohio.*

DEVOURS TEN TONS OF DIRT YEARLY! *Biologists have found that over 22,000 pounds of earth pass through the average earth worm every twelve months.* — *Warren Barrows, Riverside, Calif.*

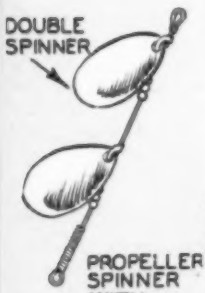
1,200 PINTS OF ORDINARY WATER MAKE ONE PINT OF HEAVY WATER! — *Chemists need 150 gallons of ordinary water to manufacture $1,250 worth of heavy water. Francis McDonnell, Toledo, Ohio.*

Win $1! Send your Oddity of Science to Nic Sprank, Modern Mechanix & Inventions Magazine, 529 So. 7th St., Minneapolis. Reveal source or proof of each item. Submit all oddities separately, not with other manuscripts or letters

SPINNER and FLY KINKS

by **ROBERT PAGE LINCOLN**

Hunting and Fishing Editor



FEW fishermen realize the great sport that can be had by using the fly rod and the spinner and fly combination in taking croppies, sunfish, and other pan fish. The fly and spinner combination used with the fly rod is one of the most effective means of taking bass, trout, and pan fish.

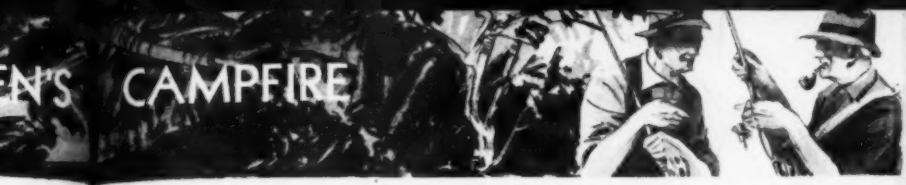
The flies and spinners can be purchased in combination or separately. Separately the spinners can be used with any fly in your tackle box.

For average all around bass fishing and for taking large trout the size of spinner mostly favored is the No. 2, either possessing a gold or a nickel finish. It is recommended that both be carried in the fly and spinner box as both are extremely effective. Spinners should be carefully wiped and polished at the close of the fishing, and, if possible, coated with a film of white vaseline which prevents tarnish. Since it is the flash of the spinner that attracts the fish, it is well to keep your spinners bright if you are to take those hulking big trout or bass.

With the No. 2 spinner on its shaft use the No. 1-0 bass fly in any of the popular patterns such as the Yellow Sally, the Brown Hackle, the White Coachman, the Fischer, and the Grizzly King. Since you can remove the fly and slip on another style in so many seconds, it is possible to change flies at any time easily until the right fly the bass are taking is located.

Probably the most popular bass fly pattern is the Yellow Sally, the same being without feather wings, just the inch-long hackles at the head. In some cases it will be found more effective to clip off the wings of fly patterns, permitting only the hackles to decorate the fore-part of the fly. Often bass flies have enormous upstanding wings making faulty the movement of the lure and spinner. When a spinner is added in front of the fly, its fly identity is practically obliterated, the flash of the spinner making the fish think it a

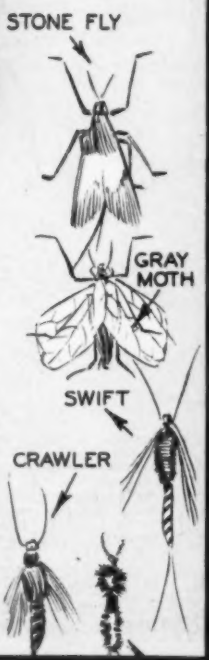
An ideal way to go after pan fish is to wade into the water around shore and flick out a short line with the fly rod. Although the fish will often take only a fly, it will be found more effective to use a fly and spinner combination. At left are illustrated a few popular fly styles, the single spinner and fly, the double spinner which can be interchanged with various fly types, and the propeller style spinner.



For PAN FISH and BASS

If you really want to have fun while catching the "little ones" of the fish kingdom, try using the fly rod and spinner. Even still fishing with a fly rod is great sport, but fly casting for pan fish is almost equal in thrills to trout fishing. Here are good tips on taking small fish.

At right—A fine catch of croppies, excellent pan fish, caught with the fly rod in Big Lake, Ocala National Forest, Florida. In the panel at right are some effective flies and bug lures. Insects are especially effective in the evening. At times it is advisable to clip the wings of flies when used in combination with spinners. Other insect lures and flies can be used and changed while fishing until the best is found.



shiner minnow of sorts rather than a fly. Therefore the feather wings are not always necessary and can be clipped off.

The No. 1 and 2 spinner is best for bass fishing in average clear water, the former being excellent for trout in rushing or cloudy water. The No. 3 is best for dark, roiled or dingy water, and rushing water as well. The No 0 size, sometimes known as the "bird's-eye" spinner, is excellent for trout fishing in average waters.

A tapered gut leader is excellent to use when the fly and spinner is used. If the leader is heavy, the action of the combination is spoiled. In addition the lure casts with remarkable ease when the graduated leader is used.

In rushing or moving water the spinner sets itself in motion. In still water it is necessary to retrieve the lure with twitches of the rod-tip. Because of its "just right" weight the fly and spinner combination handles with great ease and almost anyone can make accurate casts with it.

Two spinners on a shaft add to the attractiveness and effectiveness of the lure quite often. Such a lure is especially desirable on large streams or when the water is dingy.

[*Continued on page* 128]

CAMPING Without COOKING

EVER try camping without cooking utensils? It's an old Indian custom and pioneer trappers, while on the trail, scorned such contraptions as frying pans, kettles, coffee pots, and iron griddles.

When E. E. McDonald, of Long Beach, Calif., outdoors man who spent his boyhood among the Indians of Kansas and Oklahoma, goes camping he carries little except one blanket, a knife, fish lines and hooks, a rifle, or bows and arrows, some hardware wrapping paper, two or three big potatoes and a little bacon and navy beans. He refuses to take matches as he prefers to make fire with a rock and steel, using the squared corners of his closed pocket knife blades, next to the hinges, as the steel with which to chip off sparks from a flinty rock.

"Lint off trees, or partly decayed dry wood can be found anywhere," says "Double E." "When the spark catches in a little pile of it, lift the pile above your head so as to form

Illustrated above are several methods of cooking in camp, used originally by Indians and trappers. Hull out potato, stuff with any food except string beans, and bury in fire coals. Center shows baking without oven.

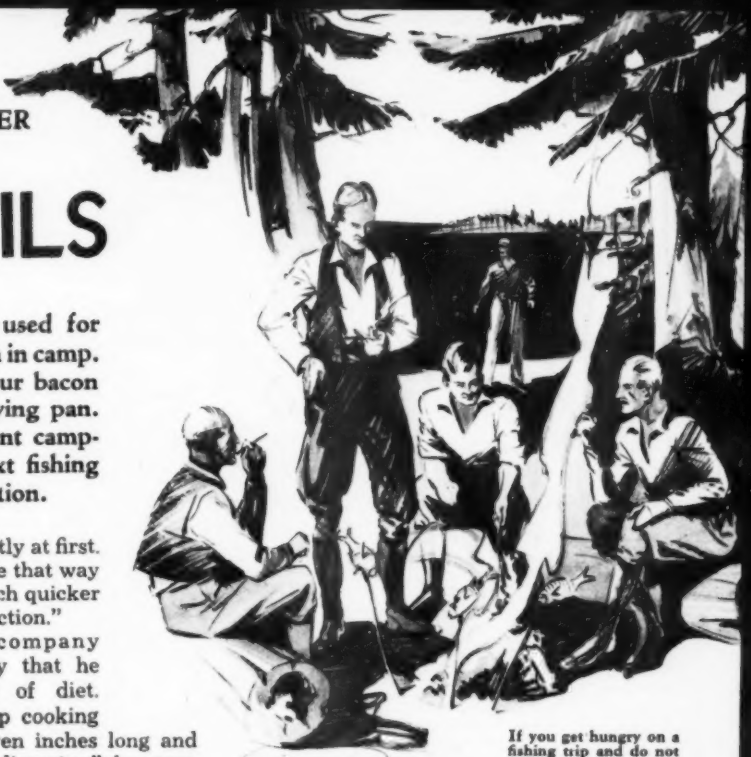
Biscuits can be baked by using two boards to catch heat as shown at left. Above—Sleeping without covers. Place log near fire to act as reflector and sleep on single blanket.

CAMPFIRE

by
CARL F. BLAKER

UTENSILS

A big potato can be used for cooking almost any dish in camp. You can even have your bacon and eggs without a frying pan. Here are some excellent campfire kinks for your next fishing or hunting expedition.



a draft and blow very gently at first. It is no trick to build a fire that way and flint and steel are much quicker than building a fire by friction."

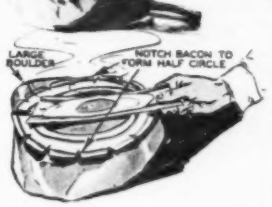
The big potatoes accompany Double E on the theory that he might want a change of diet. "There is no better camp cooking utensil than a potato seven inches long and three or four inches in diameter," he says. "Anything can be cooked inside a potato, except string beans."

His method follows: Cut the potato in halves. Hull out the inside, to whatever size your meal requires. Stuff with anything that's good to eat. Bacon is not good if it is too fat. Put the halves together again. Wrap in green leaves, wet paper, clay or adobe mud, wet paper being preferred. If mud is used, be sure to punch a hole through it to the potato to let out the steam. Otherwise it will explode. Bury in the campfire coals. Cover with coals well, so no air will get to the potato.

An old fire will cook quicker than a new one, because the ground is hot. About an hour and forty minutes are required for cooking in this style. White Rose or Russet potatoes are better cooking utensils than other varieties.

While most outdoors men have heard their elders discuss the merits of cooking fowls and small animals in coals after plastering them with clay mud, a majority never have tried it.

In the method McDonald learned from the Indians the fowl is not cleaned at all. The bird is killed by cutting into the brain with a knife and letting it bleed freely. Do not draw the fowl or even remove the head. Just work the mud well into the feathers, roll it



If you get hungry on a fishing trip and do not have camping utensils, use the tips given here for a tasty meal. Bacon and eggs can be cooked on a stone as shown at left. Notch two strips to form half circle, cross with third, and drop white of egg, then yolk, on hot stone. To turn the egg use the straight strip as handle.

in the mud, working it down to a smooth surface about half an inch thick all over. Punch a small hole through the mud to allow the steam to escape and bury in the coals.

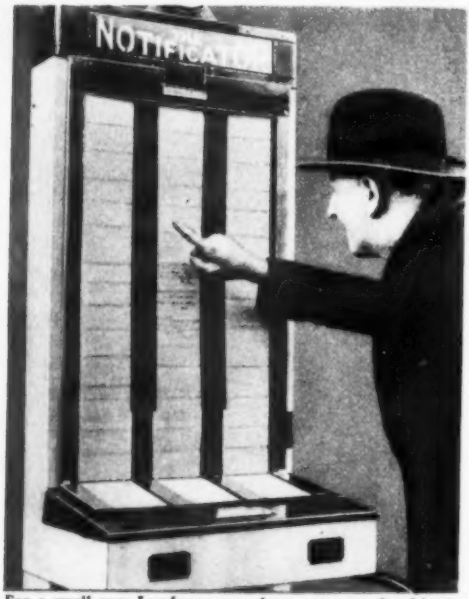
Cooking requires approximately 15 minutes to the pound. When done, crack the mud and peel. The feathers will come off with clay leaving the meat clean. Remove the insides. To your great surprise the entrails will have formed into a small ball, easy to take out and above all, they have left no taste whatever in the meat. Those who may object to this method can clean the fowl and remove the feathers before covering it with mud.

The mud ball method can be used in cooking any animal, except muskrat, sheep and goat. In these the musk from the skin permeates the meat making it unfit to eat. In such animals the meat is ruined the moment the outside of the pelt touches it.

To cook steaks primitively and make them really delicious, simply toss them on live coals

[*Continued on page* 120]

Robot Messenger Displays Person-to-Person Notes In Public



For a small sum Londoners may leave messages for friends in public places. When written on "notificator," message moves up behind window, remaining in view for two hours.

TO AID persons who wish to make or cancel appointments or inform friends of their whereabouts, a robot message carrier has been introduced in London, England.

Known as the "notificator," the new machine is installed in streets, stores, railroad stations or other public places where individuals may leave messages for friends.

The user walks up on a small platform in front of the machine, writes a brief message on a continuous strip of paper and drops a coin in the slot. The inscription moves up behind a glass panel where it remains in public view for at least two hours so that the person for whom it is intended may have sufficient time to observe the note at the appointed place. The machine is similar in appearance to a candy-vending device.

New Brake Lining Floats On Drum

A NEW revolutionary automobile brake, incorporating a rivet-less lining which floats between brake drum and expanding shoe, is now on the market. The brake utilizes the entire drum circumference as compared with the more conventional types. Since the lining rotates at one-half wheel speed, the life of the lining is said to be prolonged.

Introducing revolutionary engineering principles, this new car brake lining floats between drum and shoe. It is claimed to be long-wearing, and the lining is installed without rivets.

Film Device Aids Movie Editing

EDITING of amateur movie films is said to be greatly simplified and quickly done with a new device now available. Rewinding, cleaning and splicing of films in the self-contained unit are a few of its outstanding features. The speedy rewind gears have a high ratio and automatic brakes.

Speedy editing, splicing, rewinding and cleaning of 8 mm or 16 mm films is possible with above machine when rearranging scenes.

Scientists to Brew Heavy Carbon

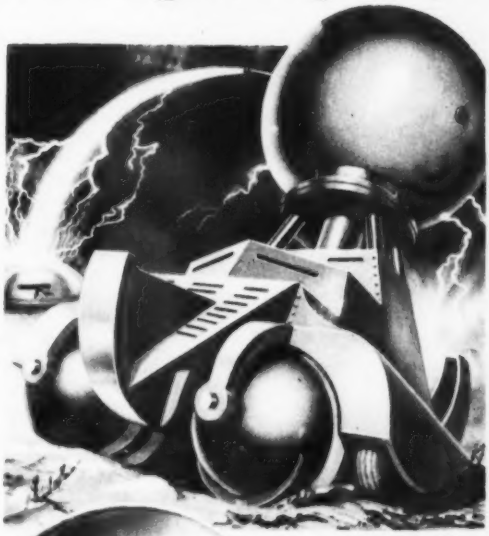
SYNTHETIC diamonds may result from the latest efforts of scientists at Columbia university to brew heavy carbon in a "whirling tea-kettle." The unique device consists of a 100-foot length of coiled pipe, compressed into kettle-like dimensions. Whirling at 2,000 r.p.m., it throws the heavier atoms of carbon, oxygen and nitrogen by centrifugal force toward the walls of the tubes. Real diamonds are believed to hold the secret of heavy carbon.

Electro-Tank Shoots Lightning Rays

LIGHTNING, enemy of man for countless centuries, may become his deadliest weapon of war. Combining the Van deGraff lightning generator with the newest high speed war tank, a design has been suggested for an electro-ray tank which promises to revolutionize offensive warfare.

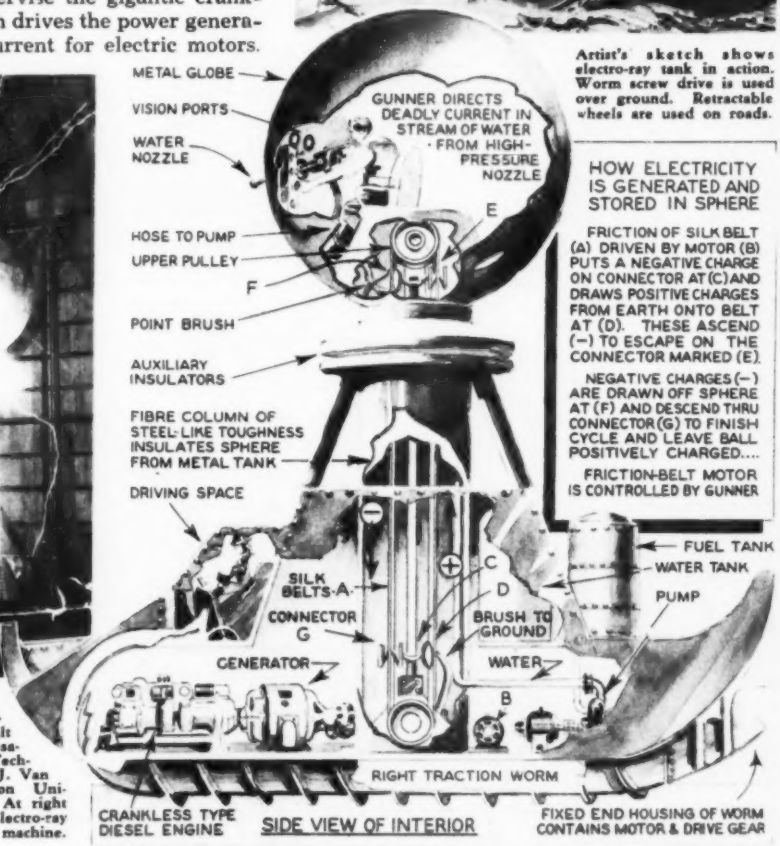
The gunner of this lightning-generating tank, seated at the control desk inside the massive metal sphere, can direct at enemy troops a small but extremely powerful stream of water, as the screw-driven vehicle rumbles forward at high speed. Along this conducting stream artificial lightning from the hundred-million volt charged sphere would crackle ominously, delivering instant death to all living creatures sprayed by the water.

Inside the heavily armored tank other men would supervise the gigantic crankless Diesel which drives the power generator to supply current for electric motors.



Artist's sketch shows electro-ray tank in action. Worm screw drive is used over ground. Retractable wheels are used on roads.

Pictured above is a 7,000,000-volt lightning generator, built for scientists at Massachusetts Institute of Technology; Dr. Robert J. Van deGraff of Princeton University is inventor. At right are details of electro-ray tank, newest war machine.


METAL GLOBE
VISION PORTS
WATER NOZZLE
GUNNER DIRECTS DEADLY CURRENT IN STREAM OF WATER FROM HIGH-PRESSURE NOZZLE
E
HOSE TO PUMP
UPPER PULLEY
F
POINT BRUSH
AUXILIARY INSULATORS
FIBRE COLUMN OF STEEL-LIKE TOUGHNESS INSULATES SPHERE FROM METAL TANK
DRIVING SPACE
HOW ELECTRICITY IS GENERATED AND STORED IN SPHERE
FRICTION OF SILK BELT (A) DRIVEN BY MOTOR (B) PUTS A NEGATIVE CHARGE ON CONNECTOR AT (C) AND DRAWS POSITIVE CHARGES FROM EARTH ONTO BELT AT (D). THESE ASCEND (−) TO ESCAPE ON THE CONNECTOR MARKED (E).
NEGATIVE CHARGES (−) ARE DRAWN OFF SPHERE AT (F) AND DESCEND THRU CONNECTOR (G) TO FINISH CYCLE AND LEAVE BALL POSITIVELY CHARGED....
FRICTION-BELT MOTOR IS CONTROLLED BY GUNNER
FUEL TANK
WATER TANK
PUMP
C
D
SILK BELTS-A
CONNECTOR G
BRUSH TO GROUND
GENERATOR
WATER
B
RIGHT TRACTION WORM
CRANKLESS TYPE DIESEL ENGINE
SIDE VIEW OF INTERIOR
FIXED END HOUSING OF WORM CONTAINS MOTOR & DRIVE GEAR

Spanish Stilt-Walker Rides Bicycle As Advertising Stunt

Residents of Barcelona, Spain, were handed a real thrill recently when this stunt man, an accomplished stilt-walker and trick cyclist, rode down the streets on this odd bike.

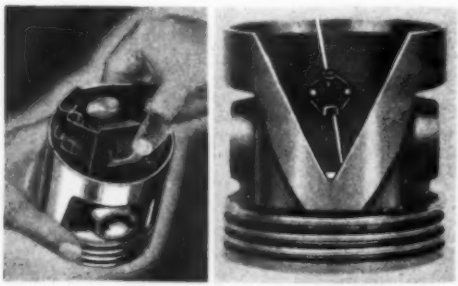
STILT-WALKING on wheels has been introduced as a publicity stunt by a silk stocking manufacturer in Barcelona, Spain.

Eclipsing the efforts of America's long-legged striders, the Spanish performer must be an accomplished trick cyclist as well as a stilt-walker.

Perfect co-ordination of the muscles and cool nerves are required if the operator is to retain his balance while driving down the streets in traffic. The oddly-shaped bicycle is approximately three times the height of an average person.

New Expanders Adjust Pistons

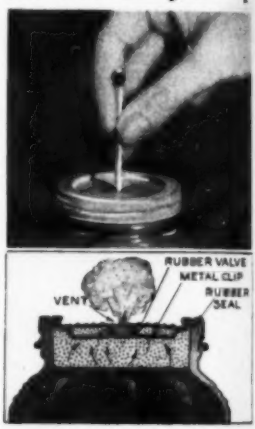
TWO new expanders for adjusting piston skirt in worn cylinders are now on the market. One type is locked in place by the piston pins and is quickly embedded in the walls. The other system requires drilling two holes for bronze pins on each side of the slot. A bolt and special nut are attached to a spring so that by turning the bolt the expanding spring widens the slot. Only one size is necessary for all pistons.



Expander at left is installed without tools and is locked in place by piston-pins. Right—Another type of expander. Turning bolt causes the expanding spring to widen the slot.

Match Opens New Vacuum Jar Cap

THIS vacuum cap for glass jars is opened by inserting a match in the small vent in the center of the top. With the seal once broken, the cap can be unscrewed and used repeatedly in home canning. When the container is first filled, gas pressure generated by the hot contents keeps the vent open. Atmospheric pressure seals vent.



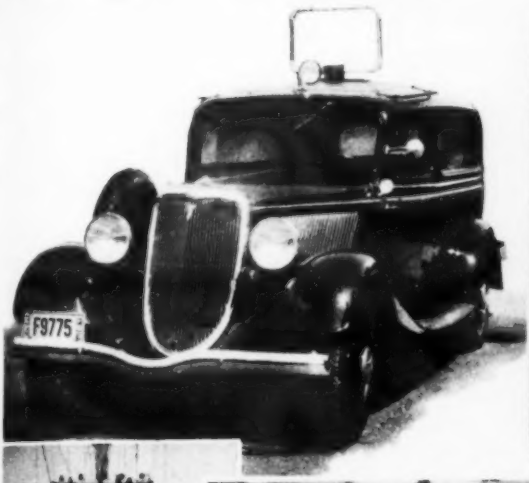
Match inserted in vent hole breaks seal of jar cap and facilitates opening. When filled, hot gases from canned food escape through vent. After cooling, atmospheric pressure reseats valve, sealing jar.

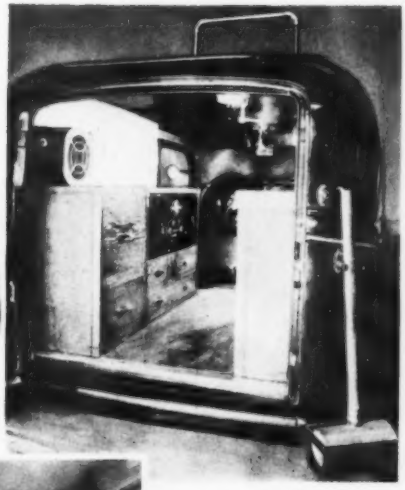
Camera Supplies Own Lighting

A NOVEL camera, especially adapted for actual-size copy work, carries its own built-in illumination. Four tiny lamps are mounted in the front part of the camera box, automatically flooding the field when the exposure lever is pressed and shutting off when the exposure is complete.

This copying camera carries interior lamps which light automatically during exposure. House current or batteries may be used.

RADIO Cars Trace Electrical Troubles





Upper left: One of the latest Canadian government radio interference cars. These locate trouble in electrical equipment before actual breakdown, save power companies thousands of dollars each year in repairs. Loop aerial on roof folds flat when not in use. Interior of this car, looking in through door at back, is shown above. Note sledge hammer at right. Powerful directional radio receivers are built into car. Drawers hold interference-eliminating coils, condensers.

At left, radio trouble car engineer is tapping a transformer pole with a sledge hammer, as part of a search for loose wires or broken insulators. Above: Interference engineer traces trouble by turning loop aerial on roof of car until noises are heard loudest in the headphones.

RADIO interference cars are constantly patrolling the streets and highways of the United States and Canada, listening for ominous noises picked out of the ether which foretell the breakdown of electrical apparatus, tracing crackling noises which may be disturbing radio reception in the vicinity.

Each interference car is equipped with a loop antenna mounted atop the car. When this is turned to the position where the noises are heard with maximum volume over the car's radio equipment, the direction from which the trouble-making signals are coming is indicated. Further bearings taken from different locations will narrow down the trouble to that motor, flasher, or thermostat which is arcing and creating interference. Local power company engineers are notified where the trouble is traced to their equipment. Linemen make repairs the same day whenever possible, to prevent serious trouble.

Many cases of trouble take weeks to trace —others can be found in a few minutes. Choke coils and condensers are always carried in the car, to be connected to equipment suspected of creating trouble. A giant sledge hammer mounted on the back of the truck is used to tap power line poles that might have loose insulators, while an engineer inside the trouble car listens for telltale crackling noises.

For eleven years a section of the Canadian Radio Branch has been seeking out and curing man-made static which was interfering with radio reception. The section has now grown to a fleet of 32 speedy radio cars hunting interference 365 days a year.

Robot Florist Dispenses Street Bouquets After Shops Close

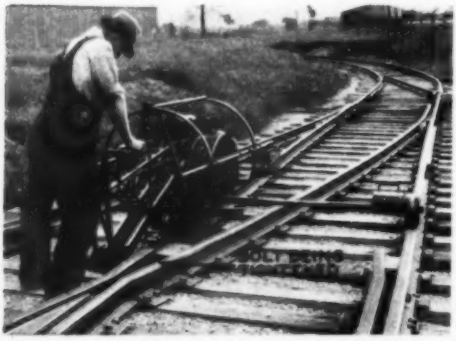
Germany's late shoppers can purchase cut flowers in street by inserting coin in vendor. Flowers are fully wrapped.

AN AUTOMATIC flower-vending machine is the latest aid for the husband who chronically forgets the occasion of his wife's birthday or the wedding anniversary until after the flower shops have closed.

Located at strategic points in Berlin's shopping center, the newly-introduced vendor carries a plentiful supply of fresh cut flowers which, like gum and candy, are dispensed by depositing a coin in the slot. As a further convenience, the bouquets are wrapped when delivered.

Huge Wrench Tightens Rail Bolts

A GIANT power wrench on wheels is used for tightening nuts on bolts on railroad track joints. An arm carrying the wrench which engages the nut derives its turning power from a 4 h.p. air-cooled gasoline engine. The operator's hands are on the control levers at all times. The wrench arm is supported by large coil springs and the mechanism is easily operated by one man.



This mechanical wrench slides over the rails, tightening loose nuts and bolts and removing frozen ones. Motor-turned, the powerful wrench is hand-controlled at all times by operator.

Bridge Lamp Arm Adjusts Light

Three positions of extension arm bridge lamp are seen above. It may be used for reading or general illumination merely by tilting arm at desired angle.

AN EXTENDABLE arm on a new type of bridge lamp permits tilting the light source at any angle. If, for example, illumination over a card table is desired, the arm swings outward or upward to give even lighting. The arm works on a hinge, thus converting the unit into a reading lamp, piano lamp or bed lamp merely by making the adjustment on the standard.

Catapulted "Bomb" Puts Out Fire

A GLASS "bomb" fire extinguisher throws itself into the flames when heat melts a plug to release spring tension in the wall bracket. When catapulted, the bursting bulb spreads an extinguishing fluid to smother flame.

Fire extinguisher is hurled into flame when heat melts alloy plug.

New INVENTORS—Take ADVANTAGE Of PUBLIC INTEREST In SPORTS Field

CELLAR TARGET FOR RIFLE PRACTICE
SOUND PROOF PUNCHING BAG WALL BRACKET
REPLACEABLE SPIKES FOR SPORT SHOES
WATERPROOF POCKET FOR BATHING SUITS

The inventive person who is looking for remunerative fields will find plenty of opportunities in developing new devices for America's sports lovers. Pictured on this page are only a few of the many needed inventions. Information on your patent can be obtained by writing the Patent Editor, care of *Modern Mechanix and Inventions Magazine*, Minneapolis, Minn.

DURING the past ten years America has gone sports-mad. Golf, football, table tennis, archery and a dozen other sports have stimulated public interest to a high degree. Naturally, the wise inventor takes advantage of such a situation and turns his talents to the perfection of things which appeal to sports lovers.

This month our department is devoted to problems along this line because many new things are awaited. Inventors of meritorious articles will have little trouble disposing of their rights at handsome figures.

For many years skaters have been looking for a little pocket sharpener which could be used to trim runners without fuss or bother. A million such articles could be sold within a year. Royalty would average between five and ten cents apiece.

While we have pocket baseball scoring devices, there is needed at present a combination scoring device which can be used both at baseball and football games. For football, the device should record the total yardage for each side. The article should not sell for more than fifty cents.

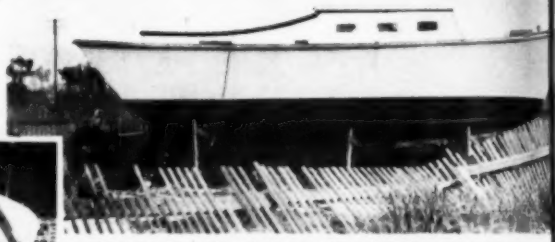
A basket-ball goal that will automatically record each basket on a scoreboard is needed. Shots for fouls should be compensated for by

[*Continued on page* 142]

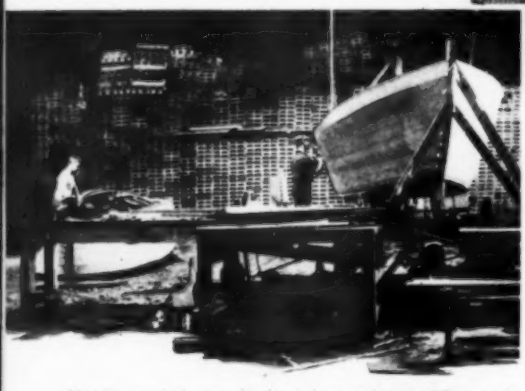
HIS SUCCESS CAME from

Read how Clarence Ackerman, California handyman, gained success by helping others build MM boats. He sells completed frames, rents space in his back yard where the boat can be finished, and gives advice to beginners.

Each of these MM readers has built a boat at Ackerman's famous shop on Mission Road, Alhambra, Calif. The two on the left each own a *Scram;* the other men have each built a *Dorothy,* while the youngster owns the tiny *Sez You* on the trailer.



Hearing about the Ackerman boat building plan, Dewey Chausse came all the way from Alaska to build this *Dorothy* at Alhambra, California. Chausse, pictured above with his boat, plans to use it for cruising and fishing in Alaskan waters this summer. Both sails and marine engine are used.



Here's a typical scene in the Ackerman boat-building establishment. At the left, Al Bortz is hard at work on the planking for a *Scram;* workman at right is sanding down mahogany *Dorothy* hull. All builders may use power tools in foreground. This workshop was once a tile factory.

by **F. WESTON EARLE**

WHEREVER backyard boat building is in progress you will find that MM plans are "tops" in popularity by actual numerical count of the boats built. With government statistics showing that one-third of the 268,000 registered motorboats in this country have been built by amateurs, MODERN MECHANIX & INVENTIONS MAGAZINE takes just pride in presenting here photographs of boats which have been built from the large fleet of MM plans.

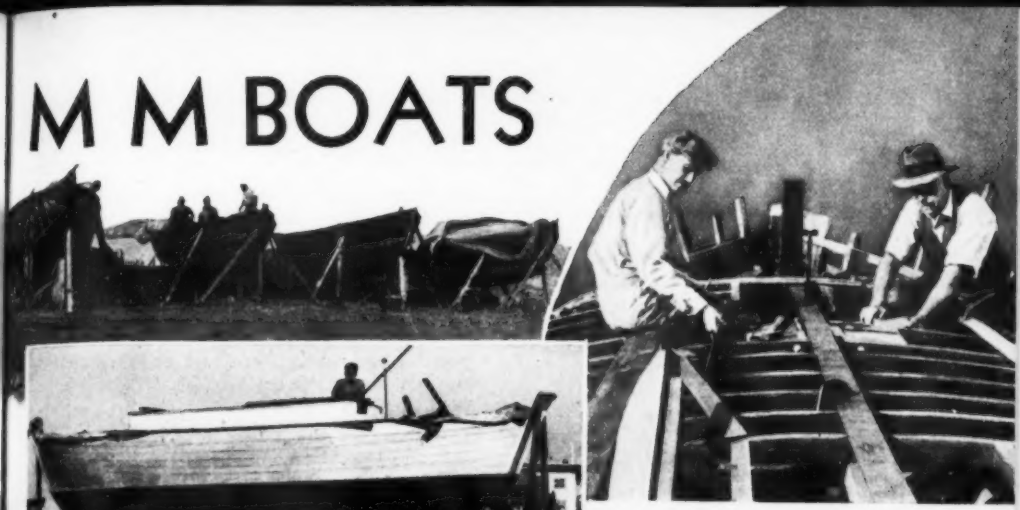
Of particular interest to boat fans is the way these boats have worked out, where they are being built, and some of the novel out-of-the-depression tales that have arisen. Take the case of Clarence Ackerman, of Mission Road, Alhambra, Calif., for one example.

A year ago Ackerman was working in a garage as a mechanic. He saw the plans of John G. Hanna's *Dorothy* design, published in this magazine. Ackerman built a *Dorothy* in his backyard. A man came along and wanted to build another for himself. This gave "Ack" an idea.

He rented space in his backyard to prospective builders, sold them a completely set up frame for $85, ready to plank. The terms were $35 down and $15 a month. The idea took like wildfire, and soon Ackerman's backyard overflowed with *Dorothys* and other boats.

In all, eleven hulls of *Dorothy* have been constructed. They have proven very boaty, very economical to build, and are good seagoing little ships for salt water. Owners who have had best results have built exactly to the plans as published, without any changes. One or two have added cabin height, or have

M M BOATS



Top: Three *Dorothys* with hulls planked are among those being completed in Clarence Ackerman's back yard. Just below is C. J. Wentschler of Waterhouse Landing, Calif., with his *Tahiti*, a sailing cruiser built from MM plans. Other *Tahitis* are under construction all along the West coast from the same plans. Jack Hanna is designer of *Tahiti*.

These two old time boat builders, C. J. Russell and Jim McNeil, make a living assisting backyard builders with their difficult boat problems.

Clarence Ackerman is shown above with the sign which, together with his reputation for building seaworthy MM boats, has brought fame and success. His business was once just a hobby. Another MM *See You* is on the trailer.

changed the sheer, but they do it only over Ack's dead body.

Ackerman outgrew his backyard, moving into large quarters in an abandoned tile factory, where, under the bell-roof of 100-foot span an augmented fleet is lined around the walls like locomotives in a round house. Clamorous aspirants are kept waiting until more space is acquired, and five full time boat builders are employed on work for owners who wish their boats launched in a hurry. Ackerman is by way of being famous up and down the west coast, and he gives full credit to the plans which he found in MODERN MECHANIX AND INVENTIONS MAGAZINE.

"I find MM plans the most practical," he says. "There isn't one that has been published from designs by Hanna, Farmer, Rabl or others that doesn't look right or behave like a real boat."

"You can't fool amateur boat fans. They know a real boat when they see it. The moneyed man will build what I recommend without arguing, but you've got to have practical, salty boats for amateurs. I've never found a group of designers that have the following that Hanna and Rabl and this man Farmer have. They sure know their boats."

Not only in Alhambra, but in other parts of the California coast this writer found other boats from MM plans in various stages of construction.

THE MM BOAT FLEET

Tahiti—30' seagoing cruiser; *Dorothy*—24' auxiliary cruiser; *Buddy*—18' sloop-rigged cruiser; *Wink*—14' inboard powered speedboat; *Gannet* — 24' Ford-powered cabin cruiser; *Olympic*—12' monotype catboat; *Sunapee*—22' cabin cruiser; *Scram*—15½' speedboat; *Nomad*—12½' all-purpose boat; *Pep*—Class C outboard racer; *Skedaddle*—14' outboard; *All Sorts*—10' all-purpose boat, and dozens of other tested designs by outstanding naval architects. Plans are available for these and other boats. Send three-cent stamp to MM for blueprint catalog.

Machine Breaks 3,600 Eggs Per Hour With Rotating Discs

This automatic separator accommodates six times as many eggs as may be broken by hand. Eggs fit in compartments on rotating discs. After cutters draw apart two sections of shell, the machine halts momentarily to permit operator to examine contents. Clean albumen and dry yolks always are insured.

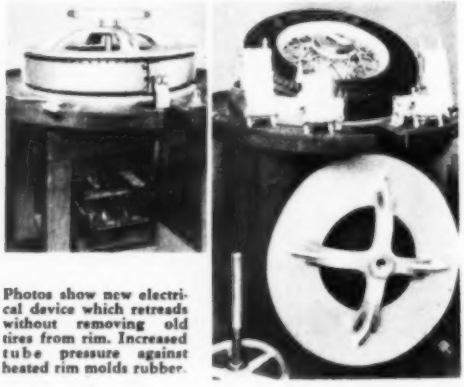
THE long-sought solution to the egg-breaking problem has been provided by an ingenious machine which is said to be able to handle 3,600 eggs per hour or six times the number which can be separated by hand.

Each egg fits into compartments in revolving discs. Rubber rollers grasp the shell firmly. As each egg comes to the breaking position, the shell is cut and discarded while the machine halts temporarily to allow separation of "whites" and yolk. The intermittent action permits quick inspection as yolks drop into individual containers.

Tires on Rim Retreaded Quickly

TIRE-RETREADING by electricity instead of the conventional steam is now possible without even removing the tire from its rim or wheel. The molds give a new-tire design and only four molds are needed to retread various tire sizes.

A tread strip of rubber is first cemented on the buffed, deflated tire. A molding ring, containing a heat unit, is dropped around the tire, then the tube is reinflated to 90 pounds and subjected to heat. The speedy process permits retreading while the customer waits.



Photos show new electrical device which retreads without removing old tires from rim. Increased tube pressure against heated rim molds rubber.

Grooved Ball Aids Golfer's Game

AN AUTHORITY on aerodynamics has designed a new golf ball covering which is claimed to resist slicing and hooking. Swirling grooves on the surface, acting as escape valves, diminish air resistance while the ball is in flight, thus holding it true to its course. Regardless of the ball's position in flight, the air passes evenly around it to improve the stroke.

Grooves on new golf ball act as escape valves, permitting air to pass around ball with minimum of resistance while ball is in flight.

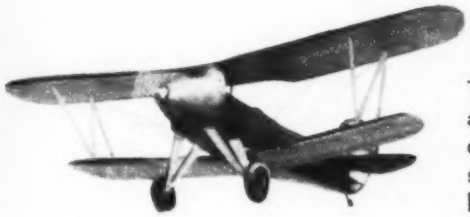
Suction Cup Holds Tube to Shelf

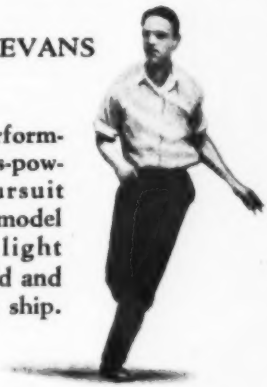
A RUBBER suction cup built into the cap of collapsible tubes permits suspending containers of toothpaste or shaving cream from the bottom of any shelf. By depressing the cup against a smooth surface, the tube may be unwound with one hand.

New suction cup on tube keeps contents sanitary, eliminates fumbling and provides easy removal.

TINY Gasoline MOTOR Powers
This FLYING MODEL PLANE

by DONALD EVANS





The amazing performance of this gas-powered midget pursuit ship appeals to model builders and light plane fans. Build and fly this excellent ship.

Soaring away at the take off, the model is shown above leaving Metropolitan airport at Van Nuys, Calif., on one of its timed-controlled flights. Right—rear view of the excellent little ship. Propeller is being spun to start the little gasoline motor. The ship has a six-foot wing span and is a working model of the famous Berliner Joyce pursuit plane.

PART I

THIS model gas plane will appeal to all model builders and the aviation enthusiasts who have been grounded by Department of Commerce regulations against light planes. You can have nearly as much fun, learn as much about airplane feel and balance, from making this highly successful flying gas model as you can from building and flying a light plane.

The performance of the little ship is amazing. It will fly 15 minutes on one tankful of gas. It lands at a flat angle, and can be preset to slowly circle the field on which it is flown. After many tests, it was fitted with a miniature 16 m.m. camera, and it took off with this 2 lb. load, taking a complete record of a model airplane in flight. Projected on the screen, the shots gave a gnat's eye view of what a landing looks like from the cockpit of a model plane!

The wings are being set in place and the flying wires rigged by turning turnbuckles. In case of a crash shear pins break and the wings of model fall off, preventing serious damage.

It has outflown, outclimbed and outperformed many touted designs. It is powered with a ⅛ h.p. 2-cycle air cooled single cylinder gasoline engine. The particular motor used in this model weighs 6½ oz. and has a ⅞-inch bore and 1-inch stroke.

To prevent the model from flying out of sight it has been fitted with a little timer made from three old clock wheels. This starts func-

DRAWINGS SHOW COMPLETE FUSELAGE DETAILS

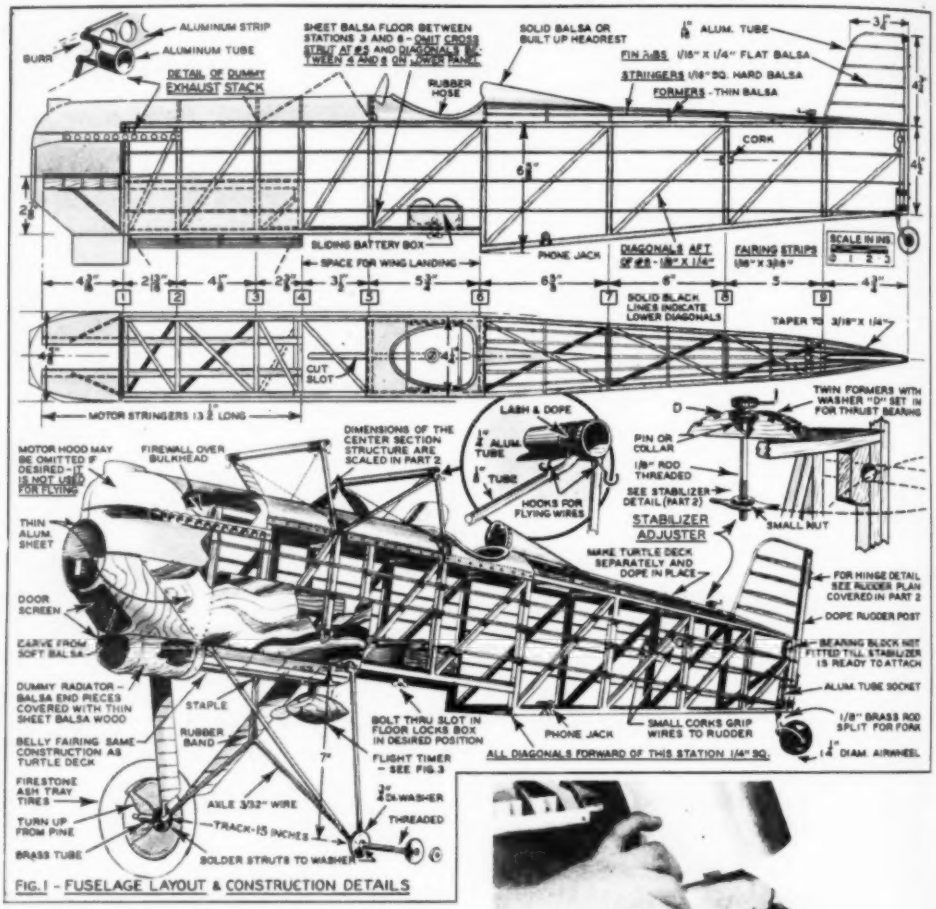

ALUMINUM STRIP
ALUMINUM TUBE
BURR
DETAIL OF DUMMY EXHAUST STACK
SHEET BALSA FLOOR BETWEEN STATIONS 3 AND 6 - CRISS CROSS STRUT AT #5 AND DIAGONALS BETWEEN 4 AND 6 ON LOWER PANEL
RUBBER HOSE
SOLID BALSA OR BUILT UP HEADREST
1/8" ALUM. TUBE
FIN RIBS 1/16" X 1/4" FLAT BALSA
STRINGERS 1/16" SQ. HARD BALSA
FORMERS - THIN BALSA
CORK
SLIDING BATTERY BOX
SPACE FOR WING LANDING
PHONE JACK
DIAGONALS AFT OF #3 - 1/8" X 1/4"
FAIRING STRIPS 1/16" X 3/8"
SCALE IN INS
SOLID BLACK LINES INDICATE LOWER DIAGONALS
TAPER TO 3/16" X 1/4"
CUT SLOT
MOTOR STRINGERS 13 1/2" LONG
LASH & DOPE
1/4" ALUM. TUBE
1/8" TUBE
HOOKS FOR FLYING WIRES
TWIN FORMERS WITH WASHER "D" SET IN FOR THRUST BEARING
PIN OR COLLAR
1/8" ROD THREADED
SEE STABILIZER DETAIL (PART 2)
SMALL NUT
STABILIZER ADJUSTER
DIMENSIONS OF THE CENTER SECTION STRUCTURE ARE SCALED IN PART 2
MOTOR HOOD MAY BE OMITTED IF DESIRED - IT IS NOT USED FOR FLYING
FIREWALL OVER BULKHEAD
THIN ALUM. SHEET
MAKE TURTLE DECK SEPARATELY AND DOPE IN PLACE
FOR HINGE DETAIL SEE RUDDER PLAN COVERED IN PART 2
DOPE RUDDER POST
DOOR SCREEN
CARVE FROM SOFT BALSA
BEARING BLOCK NOT FITTED TILL STABILIZER IS READY TO ATTACH
ALUM. TUBE SOCKET
DUMMY RADIATOR - BALSA END PIECES COVERED WITH THIN SHEET BALSA WOOD
STAPLE
RUBBER BAND
BELLY FAIRING SAME CONSTRUCTION AS TURTLE DECK
BOLT THRU SLOT IN FLOOR LOCKS BOX IN DESIRED POSITION
PHONE JACK
SMALL CORKS GRIP WIRES TO RUDDER
1/8" BRASS ROD SPLIT FOR FORK
ALL DIAGONALS FORWARD OF THIS STATION 1/4" SQ.
1/4" DIAM. AIRWHEEL
FLIGHT TIMER - SEE FIG. 3
FIRESTONE ASH TRAY TIRES
AXLE 3/32" WIRE
TURN UP FROM PINE
TRACK-15 INCHES
BRASS TUBE
SOLDER STRUTS TO WASHER
3/4" DIA. WASHER THREADED

FIG. 1 - FUSELAGE LAYOUT & CONSTRUCTION DETAILS

Lay out full size profile and top plans of the fuselage before starting to build. Longerons and struts are 1/4" square hard balsa. Step between stations 4 and 6 is occupied by lower wing landing. Stabilizer adjuster can be made by setting pin in knurled head or into slot of round head bolt. Full details of fuselage construction are shown in Fig. 1.

tioning when the plane takes off, and shuts off the ignition after a few minutes run. Then the plane comes down in a gentle glide. After the first tests no crackups were experienced. The plane presented here is a tried model and will give excellent satisfaction.

In general this model differs only in size and certain minor details from the ordinary model airplane with which all builders are familiar. This being the case it is unnecessary to dwell upon the actual construction excepting in such instances as may seem to require explicit instruction.

The fuselage which is built first presents

Here is an excellent view of the cowling used on this model. The fire wall is carried up to the hinged cowl as shown in Fig. 2. Note door screen, dummy radiator, ash tray tires, and dummy exhaust stacks shown in above photograph.

FIRE WALL PROTECTS MODEL from MOTOR EXHAUST

no unusual difficulty. It should be made from ¼"x¼" *hard* balsa with the same size wood for all struts and diagonals from front bulkhead to back of the cockpit. The drawings in Fig. 1 give almost all necessary details and instructions as to materials for building the fuselage proper.

The fuselage bottom panel forward of station 6 forms an abrupt step. Between 4 and 6 this step is later occupied by the lower wing landing, dealt with in the next instalment. Forward of No. 4

[*Continued on page* 126]

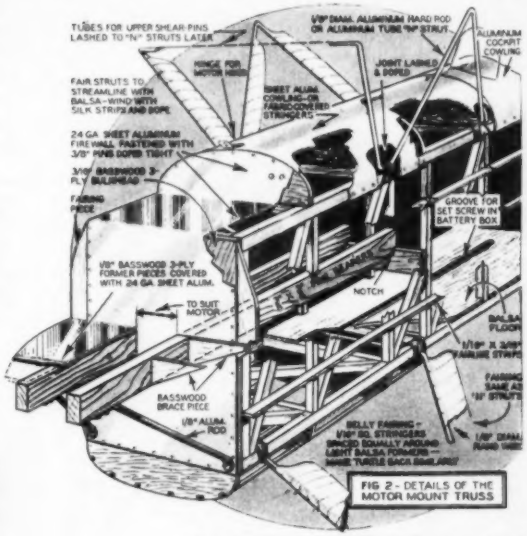
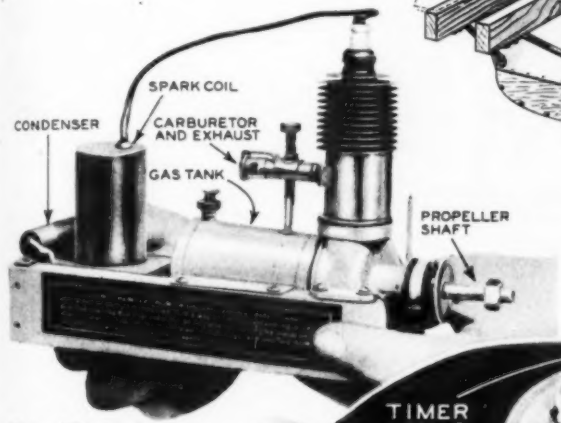
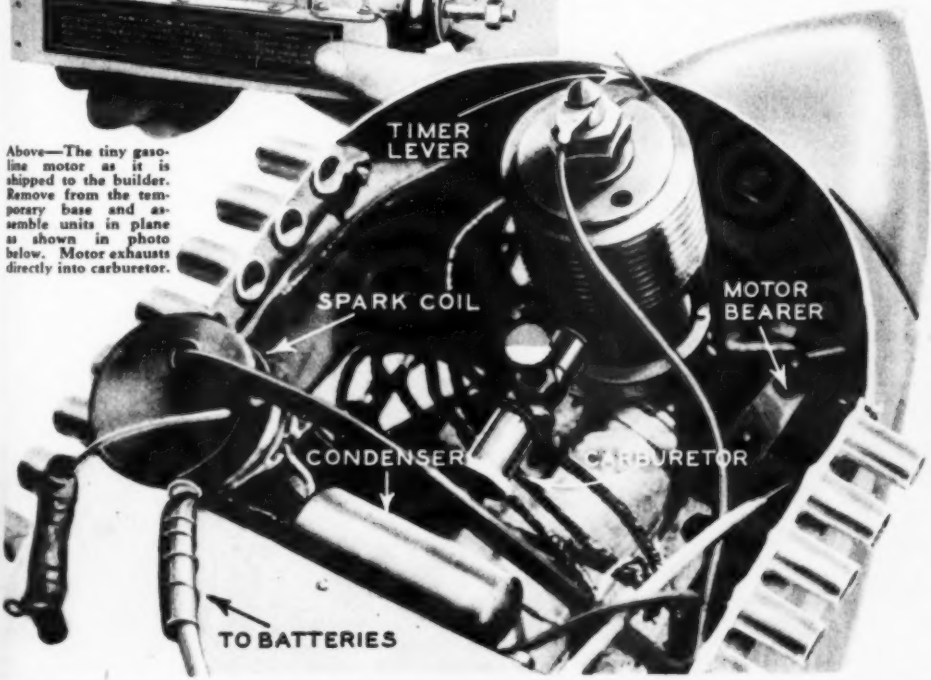

TUBES FOR UPPER SHEAR PINS LASHED TO "N" STRUTS LATER
HINGE FOR MOTOR MOUNT
FAIR STRUTS TO STREAMLINE WITH BALSA—WIND WITH SILK STRIPS AND DOPE
24 GA SHEET ALUMINUM FIREWALL FASTENED WITH 3/8" PINS DOPED TIGHT
3/16" BASSWOOD 3-PLY BULKHEAD
FAIRING PIECE
1/8" BASSWOOD 3-PLY FORMER PIECES COVERED WITH 24 GA SHEET ALUM.
TO SUIT MOTOR
BASSWOOD BRACE PIECE
1/8" ALUM. ROD
JOINT LASHED & DOPED
SHEET ALUM. COWLING—OR FABRIC-COVERED STRINGERS
GROOVE FOR SET SCREW IN BATTERY BOX
NOTCH
BALSA FLOOR
ALUMINUM COCKPIT COWLING

FIG 2 - DETAILS OF THE MOTOR MOUNT TRUSS

Landing gear and "N" struts are made of ⅛" rod bent to shape and streamlined with balsa. The motor mount bearers run through fire wall and bulkhead. For a firm mount lash and dope bearers to cross-pieces. Do not build mount before getting motor.

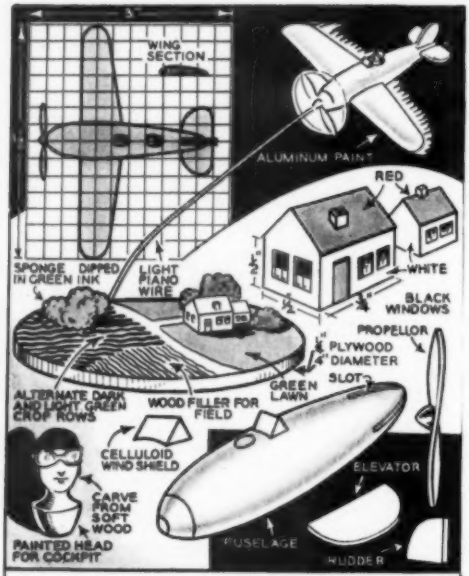


Above—The tiny gasoline motor as it is shipped to the builder. Remove from the temporary base and assemble units in plane as shown in photo below. Motor exhausts directly into carburetor.



This full size reproduction of the tiny motor used in this mode' plane gives an idea of its midget proportions. Dummy exhaust ports are made of aluminum tubing in 12 evenly spaced 5/16" holes in a strip of 1/32" aluminum. Peen tubes into holes.

Mold Amusing Novelties with Plastic Wood



This miniature scene has a host of amusing possibilities. Add plastic wood men hanging from wing tips, descending in tissue paper parachutes, or straddling the plane. Make plowed furrows with plastic wood, painting dark brown. Make plastic wood hills.

GLUE RIDER TO SEAT, HANDLE BARS AND FOOT REST
ACORN HEADLIGHT PAINTED BLACK OUTSIDE, ALUMINUM INSIDE
COPPER WIRE WRAPPED AROUND 1/4" DOWEL
WOOD
WIRE
WOOD BLOCK
PASTE BOARD
FOOT REST
WOOD
GLUE WHEEL TO FORK WITH MODEL AIRPLANE CEMENT
1" DIAMETER RUBBER RINGS OR WOOD DRAPE RINGS

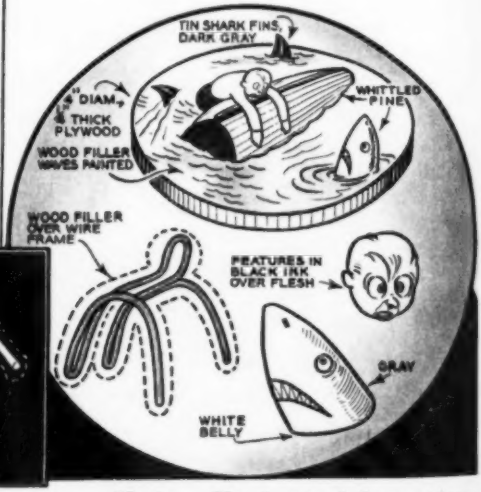
Plastic wood is molded carefully around wire frames like those at left, to make miniature figures. Mount cyclist on wood base for paper weight.

AMUSING desk novelties are easy to make by molding plastic wood over stiff wire frames. The secret of an effective grouping lies entirely in the amount of action you are able to bend into the wire frame. Painting will cover the rough spots, bring out those features you may wish to burlesque, such as hornshell spectacles, mustache, or eccentricities of dress.

The silvery airplane zooming over a miniature landscape is just the thing for an aviator's den. Saw out a plywood disc for the base. Paint some portions grass green, and make others brown to represent plowed fields. A tiny house is cut from wood, while bits of sponge dipped in green ink serve as trees. The plane is carved from white pine, and the aviator's head molded from plastic wood. For a more striking effect, mold the entire figure of the aviator, making him straddle the airplane as if it were a bucking bronco.

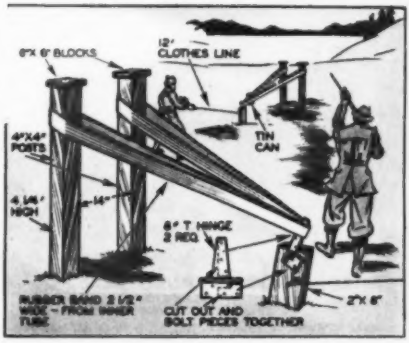
The motorcyclist is not as hard to make as may appear. Rubber rings like those used for friction wheels of sewing machines make fine wheels. No spokes or discs are required, as the tires may be glued to the forks. The rider is made of plastic wood over a wire frame, and appropriately painted. Put him on backwards, feet on handlebars and hands on foot pedals, for a comic effect.

Plastic wood waves and whittled pine sharks make appropriate surroundings for the capsized yachtsman. Work longest on the facial expression—that will draw the laughs more than anything else.

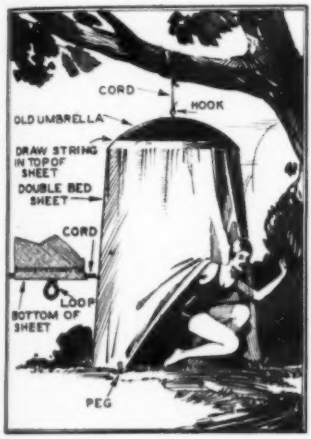


OUTDOOR HANDIKINKS

Giant Slingshot Throws Gun Targets



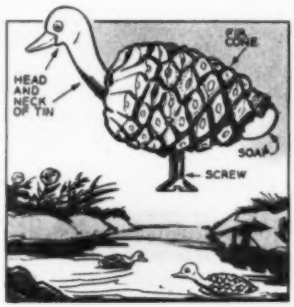
WITH this giant rubber band trap to toss tin cans high into the air, you can get real practice in wing shooting with a shotgun. Bring the tripping lever along on your vacation trip, and set up the trap when the lake is too rough for fishing. Fence posts will do for the uprights, if sunk a few feet into the ground. Tin cans, apples, clay balls, or even blocks of wood may be used as targets. The elevation is changed by moving the band up or down along the two posts. Cut the giant rubber band from the largest inner tube available.—Maurice H. Decker.



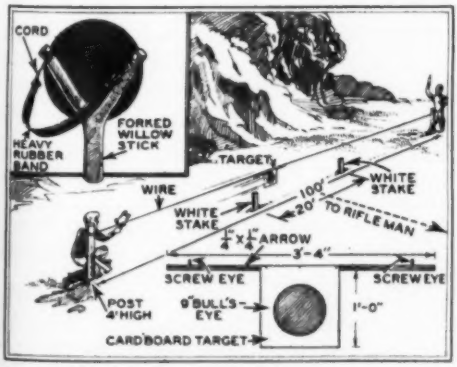
Umbrella Is Frame of Folding Dressing Room

WITH an old umbrella and a sheet you can make this simple dressing room for the beach. The tip of the umbrella is bent into a hook, and a rope fastened to it. One side of a sheet is stitched together around the opened umbrella, the ends overlapping a foot or so. A cord is stitched into a hem around the bottom of the sheet. Simply toss the rope over a tree branch, open the umbrella, and peg down the bottom of the sheet.—S. R. Allis.

Soap On Tail Propels Pine Cone Duck Toy



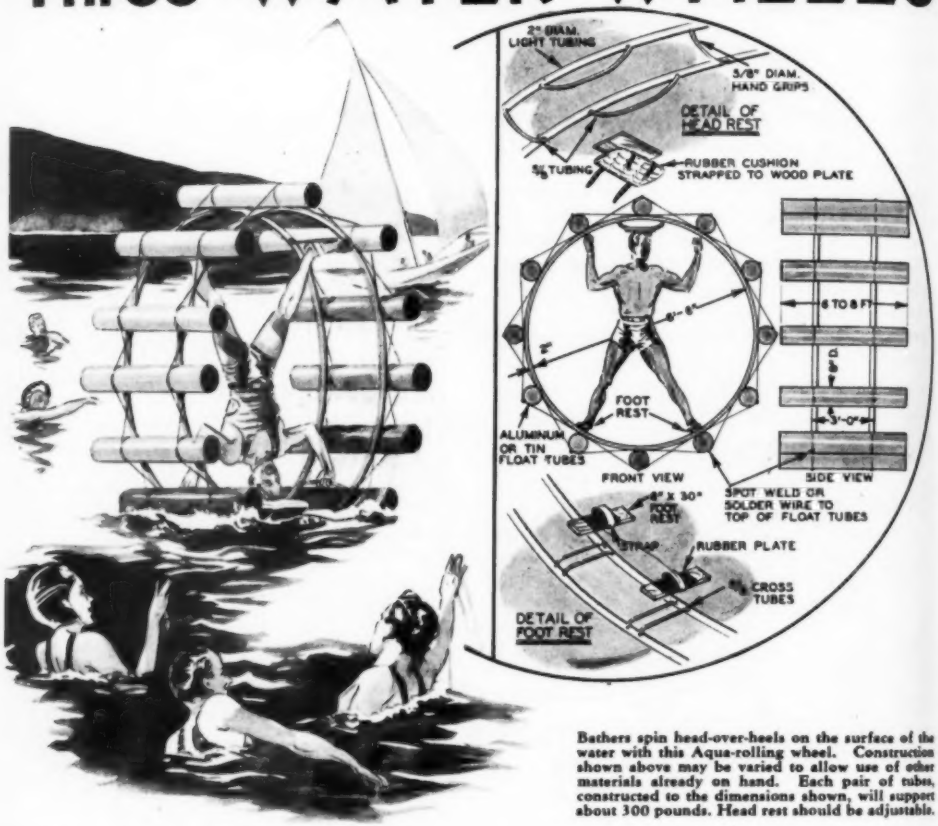
FOR amusement while at camp, or as moving water targets for gun practice, make these mystery-motion pine cone ducks. Drive a screw into one side of a large, dry pine cone, then cut a slit at the wide end and force in a duck's head which has been cut from tin. For motive power press a small piece of soap into the tail end. As the soap dissolves, it reduces the surface tension at the rear, and water in front pulls the duck along.—S. Bastin.



Arrow Target Gives Rifle Practice

A BULL'S-EYE target suspended from an arrow skimming along a stretched wire challenges the skill of any .22 rifle enthusiast. Assistants at each end of the wire, equipped with slingshots, keep the arrow target moving back and forth between two white stakes, while the marksmen try their luck. The target must be hit as it passes between these two white stake markers. Rub the wire with oil to get even greater speed. Check the hits with pencil after each round of ten shots, and have extra targets on hand, to be tacked to the arrow.—S. B. Smithers.

Three WATER WHEELS



Bathers spin head-over-heels on the surface of the water with this Aqua-rolling wheel. Construction shown above may be varied to allow use of other materials already on hand. Each pair of tubes, constructed to the dimensions shown, will support about 300 pounds. Head rest should be adjustable.

FROM far-off Holland comes the design for the first of MM's water wheels—an Aqua-roller originated by P. C. van Petegem. A wheel of tubular floats mounted on a frame of two steel hoops rolls along the water as the bather shifts his weight from side to side inside the wheel.

Build this if you like topsy-turvy fun. Make a dozen tubular floats by soldering circular discs over the ends of six to eight foot lengths of galvanized stovepipe eight inches or so in diameter. Two lengths of one-inch pipe are bent into hoops not more than six and one-half feet in diameter, the ends being fastened with a coupling or welded together. Space the floats equi-distant along the hoops, fastening with wire and solder, then make foot and hand holds and a padded head rest.

Just as the aeroplane swings at carnivals whirl fun-seekers through the air, the Outboard Swim Spinner tows swimmers through the water at breathtaking speed. Designed by L. B. Robbins, this wheel can be used with any size of outboard motor. Even surfboards may be towed in wide circles if the frame members are extended farther outward.

The center post should be as large as possible, and either sunk or driven as far down as possible. The construction of the wheel itself and the motor mount are covered in the sketches. Either the throttle or ignition control should be extended outward to one of the pull ropes, where it is always in reach of one of the swimmers.

The younger bathers will like Hi Sibley's Barrel-boat, a novel craft that is propelled by moving two levers back and forth. Truly amphibian, the boat may be rolled on land or water with equal ease.

Thirty-gallon oil drums in good condition serve as floats on water, wheels on land. In the exact center of each end of one drum is

For The BEACH

For new thrills at the beach this summer, build one or all of these novel fun wheels—the head-over-heels Aqua-roller, the Outboard Swim Spinner, or the Barrel-boat that rolls over sea or sand.

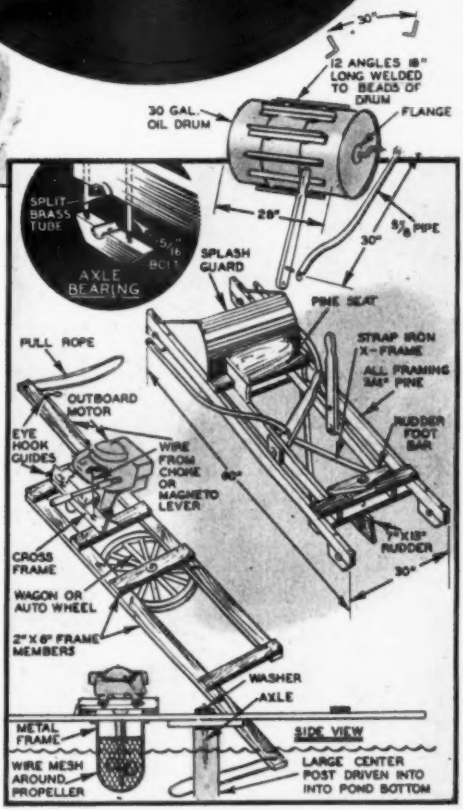
Pictured in action above are the Barrel-boat and Swim Spinner, MM contributions to swimming fun. The construction of each is shown below, only approximate dimensions being given to allow the builder to use whatever materials are most easily obtained. Be sure propeller of outboard motor is enclosed by wire screen. Adjust engine position on frame.

welded or riveted a 3-inch long axle with flange, for the front roller. On the rear roller longer axles are attached, with cranks at the outer ends set at a 90-degree angle to each other. Angle iron paddles are welded or riveted to the rear drum, and all leaks stopped up.

Axle bearings have brass bushings cut from tubing, to prevent wear and reduce friction. Make the framework light but strong, using only screws for fastening, and reinforcing with a strap iron X-brace at the bottom.

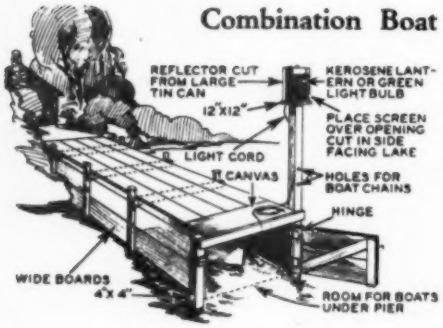
Paint all of your beach equipment in gay colors, first applying two or more coats of marine paint to all metal parts to prevent rusting.

Stay out of the deep water with all of these wheels. They'll work just as well in water three to five feet deep, and there will then be little danger of an accident.



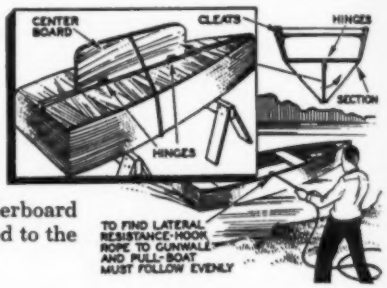
BOAT BUILDING KINKS

Combination Boat House and Pier Has Beacon Light



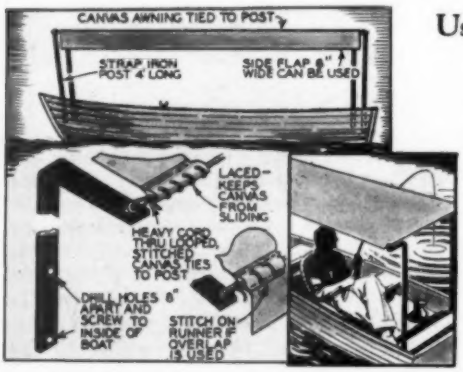
BY BUILDING that next pier a little wider and boarding up the sides, the space underneath will serve as a snug shelter for one large boat, or two smaller rowboats. A hinged door at the outer end may be equipped with hasp and staple, for locking at night. The beacon is simply an electric light bulb with a green bulb or a kerosene lantern mounted in a large tin can.—R. H. Anderson.

Installing a Centerboard On a Rowboat



THE center of lateral resistance of a boat must be found before a centerboard can be mounted. Pull the boat sidewise with a rope attached to various points on the gunwale until the point is found where the boat follows evenly. For a 15′ boat the centerboard should have an area of about 6 square feet. It is hinged to the keel, and held in position with ropes.—H. E. Throsel.

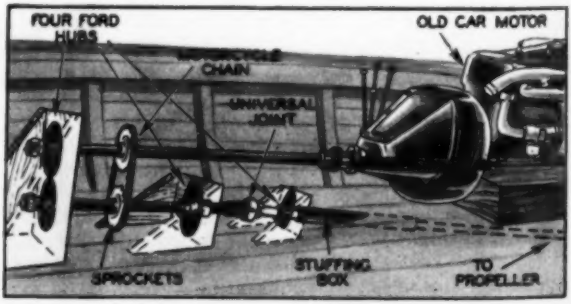
Use Boat Awning for Hot Day Fishing


CANVAS AWNING TIED TO POST
STRAP IRON POST 4' LONG
SIDE FLAP 8" WIDE CAN BE USED
LACED-KEEPS CANVAS FROM SLIDING
HEAVY CORD THRU LOOPED, STITCHED CANVAS TIES TO POST
DRILL HOLES 6" APART AND SCREW TO INSIDE OF BOAT
STITCH ON RUNNER IF OVERLAP IS USED

KEEP out of the blistering sun, when rowing or fishing on hot summer days, with this simple rowboat awning. There are no frames to interfere with fishing or rowing, and the corner posts may be folded down inside the boat by removing a single screw from each. Four foot lengths of strap iron, with 6-inch right angle bends at one end of each, are mounted inside the boat with wood screws. The angles should bend outward, to give a wider awning, and should have large holes at the outer ends. Window sash cord is sewn into the hem of the canvas.—M. J. Olson.

Vee Drive and Thrust Bearing for Boats Made from Old Auto Parts

IN THE sketch at the left is a low cost method of mounting an auto engine horizontally in a boat, yet still having the propeller at an angle. If well-constructed, this unit will perform very nearly as well as expensive commercial Vee drive gears. Ford T hub assemblies mounted on wood blocks serve as thrust bearings. The shafts will have to be machined to fit. Engine must be converted for marine use.—R. S. Coates.



Make a Tulip-Cluster Lawn Sprinkler

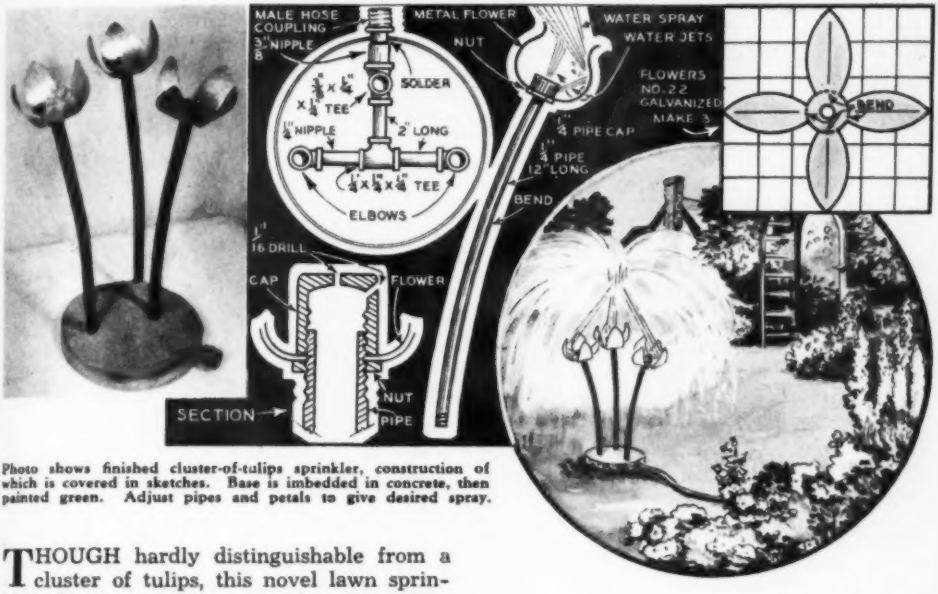


Photo shows finished cluster-of-tulips sprinkler, construction of which is covered in sketches. Base is imbedded in concrete, then painted green. Adjust pipes and petals to give desired spray.

THOUGH hardly distinguishable from a cluster of tulips, this novel lawn sprinkler throws a misty spray of water over a surprisingly large area. It is designed to harmonize with flowers in the ultra-modern lawn. Pipe fittings, which can be picked up at any plumbing shop, are the only important item of expense.

Assemble the fittings and pipe lengths as shown in the diagrams, using a nut first, then a cap on each stem to hold the tin petals in position. The base assembly is set in an 8-inch diameter circular mold and covered with concrete, to form a neat base from which only the hose connection projects. Paint the pipe stems green, the flowers red and yellow. Adjust the flower petals until the jets of water from the side holes strike them at an angle, to throw the water back into the central jet and create a fine spray.

Lawn-Maintaining Tips

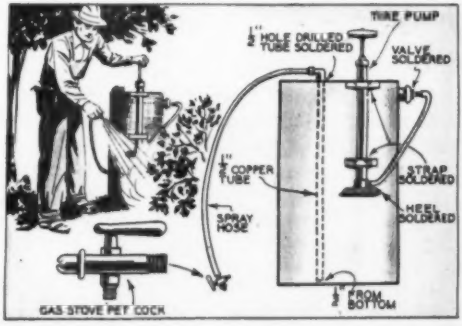
MOLES burrowing across lawns may be killed by running a garden hose from the exhaust pipe of a car into a runway, and allowing the motor to run for fifteen minutes. The deadly carbon monoxide gas will asphyxiate the moles.

Poison in the form of strychnine crystals concealed in pieces of raw potatoes, then dropped into the runways, is sure death for pocket gophers who dig up the lawn. Locate the runway with a pointed broomstick.

Convert Gas Tank Into Spray Pump

A SIMPLE pressure type sprayer for applying chemicals to plants or trees can be made at little cost from an auto gas tank, a tire pump, and a few fittings.

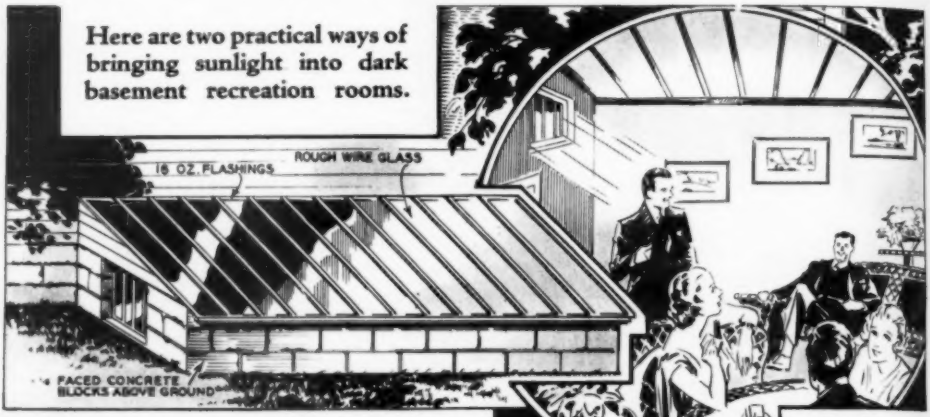
Near the top of the tank mount a valve stem from an old inner tube. Clamp the tire pump to the side of the tank, attaching the hose to the valve stem. A ½" copper tube which extends to within ½" of the bottom of the tank is next soldered in position and a coupling attached, to which a ten-foot length of garden hose can be coupled.



Shrubs, plants, and even trees may be sprayed with this homemade pressure sprayer, provided gas tank is strong and has no leaks. The nozzle is made from a gas stove petcock.

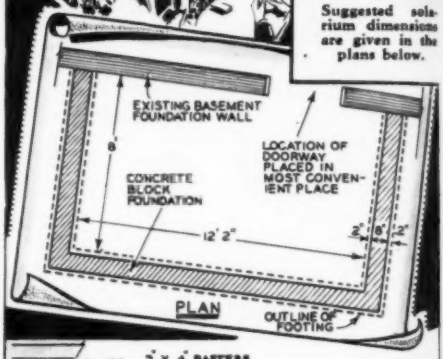
Add a Solarium or Rock Garden

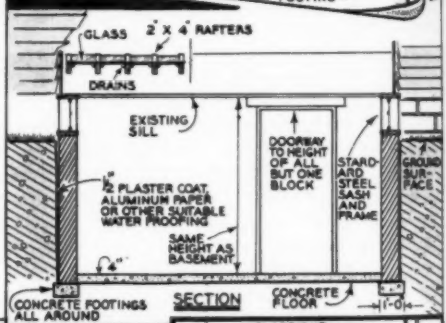
Here are two practical ways of bringing sunlight into dark basement recreation rooms.



Completed solarium rises a few feet above the lawn. Plant flowers and shrubs around the walls, to keep children off the glass roof. Interior furnishings should harmonize with those of basement recreation room just back of solarium.

Suggested solarium dimensions are given in the plans below.





BUILT as an addition to your basement, a glass-roofed solarium brings warm sunlight to your recreation room the year around. If windows are built into the wall adjoining this room, the entire basement will be flooded with light during the day.

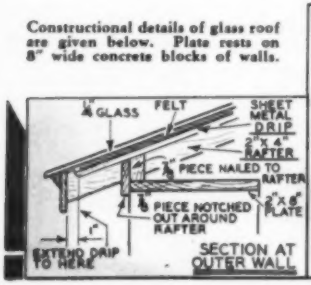
Another means for accomplishing the same result is a basement-level rock garden. Here a door in the basement wall opens out onto a unique court and pool, with rocky, flower-covered terraces leading up to the lawn.

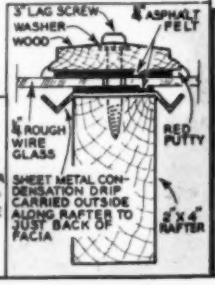
Although dimensions for the solarium are given in the plans, these are only suggestions, and can be altered to meet your particular requirements. Make the walls of this extra basement room the same size as those of the basement, using either concrete blocks or solid concrete, with good footings.

Remove enough siding from the house to tie in the solarium rafters with the house studding.

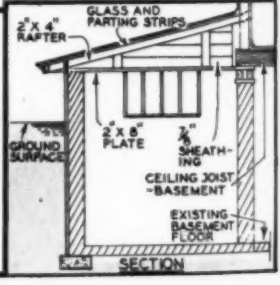
A rough wire glass ¼" thick is used for

Constructional details of glass roof are given below. Plate rests on 8" wide concrete blocks of walls.





Walls of solarium must be waterproofed on outside if interior is to be finished with plaster or wallboard. Alternate rafters are ¼" lower, and carry condensation drips as at the right.



To Your Basement Club Room

This unique basement rock garden was built by W. P. Harris of Grosse Pointe Park, Michigan.

By removing dirt from foundation wall, setting in large windows, and making rock garden outside, this attractive basement recreation room was flooded with light. Stone fireplace and hand-fitted log interior matches outdoor rock garden.

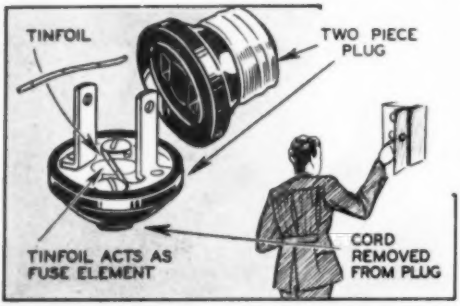
the roof. Although this is not perfectly transparent, it will admit more than enough light for all requirements. Many will prefer to use special glass that passes ultra-violet rays, and take sun baths in the solarium at times. No glass cutter is needed, as the glass can be ordered in 12″ widths, in the length desired.

Plants and flowers can be grown in the solarium just as in a greenhouse. While no heat should be necessary even in winter during days when the sun is shining, some may prefer to mount a small fan in the basement wall, to blow the warmer basement air into the solarium. The sunken rock garden just outside the Harris home was the solution to the problem of getting sunlight into the basement recreation room. Soil was cleared away from one wall and large windows set in, to flood the attractive log cabin interior with warm light. The rock garden and pool ideas unfolded as a natural sequence.

The stone floor of the bowl is three steps higher than the basement floor, but is well drained by a trough that extends around the outer edge, concealed under the lowest ledge of the rock garden. Water cascades down from pool to pool from the fountain at the top to the larger pool at the bottom. At one side is an irregular flight of stone steps leading to the lawn.

Within, the feeling that one is in a basement is absent, for the windows are full size, and afford a wide vista out and across the lawn. The rich tawny color of the Norway pine logs furnishes a substantial and cheery background for the reds and blues of the chairs and rugs.

ABOUT-THE-HOME KINKS

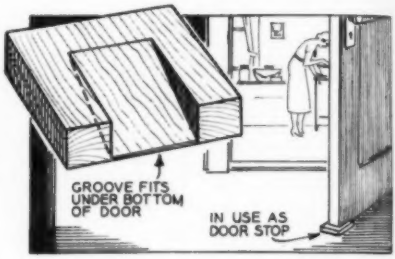


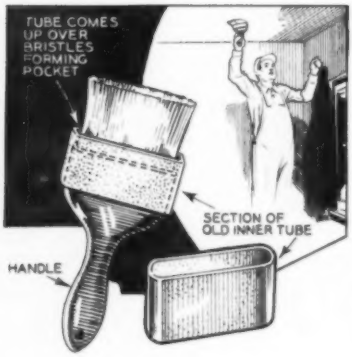
Make Your Own Emergency Fuses

EMERGENCY fuses which may be used with safety can be made from a two-piece electrical plug and a strip of tinfoil. Loosen the screws in the bayonet plug, place a short strip of tinfoil between, and tighten. The two parts of the plug can now be pushed together, and used exactly as in an ordinary fuse. The tinfoil can always be seen through the hole in the plug, and replaced easily when melted by overload currents.—T. Vernon.

Two-Way Doorstops Cut from Blocks

THE advantage of this doorstop is that it will hold the door rigidly in any position, without marring either the door or the floor. Four-inch square blocks are cut from a one-inch thick hardwood plank as shown in the sketch. The groove is now cut with a sharp chisel, and should be about half an inch wider than the widest door in the house. Paint each block the same color as the door on which it will be used.—Joe Baxter, Jr.



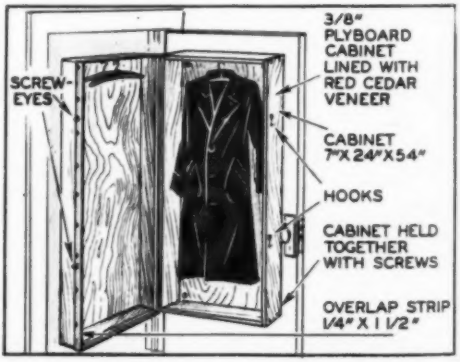


Non-Drip Paint Brushes for Ceiling Work

FEW indeed are the experienced painters who can apply kalsomine or whitewash to ceilings without spilling the thin liquid from the brush. For the inexperienced painter, who has the same difficulties with ordinary paints as well, this non-drip kink will solve the problem. Cut a band from an inner tube which will slip over the wood part of the brush without too much stretching, and which will extend over about one-third the length of the bristles. The pocket formed will catch dripping paint, holding it until the brush is again dipped in the bucket.—A. H. Waychoff.

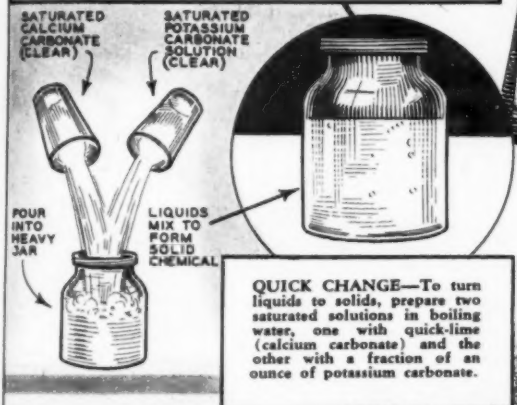
Moth-Proof Cabinet Hangs on Door

ANY handy man can make this simple cabinet with ordinary household tools. It will pay for itself many times over in the protection it affords valuable garments against moths. Make the cover and sides from plywood. Red cedar veneer will be the best for lining the inside, but equal protection against moths can be had by lining the cabinet with tar paper. Spraying with cedar oil will give the cedar aroma. The cabinet is attached to the inside of the clothes closet door with wood screws.—Dick Cole.



SIMPLE CHEMICAL TRICKS

MYSTIC BOWL—A large bowl is placed on the table, and water poured in. The magician waves his hands mysteriously, commands "Burn," and clear blue flame blazes upward. Beforehand, place a tablespoonful of ether in the heavy porcelain bowl. Dust hands with talcum, conceal piece of potassium between fingers, drop into bowl to start fire.


SATURATED CALCIUM CARBONATE (CLEAR)
SATURATED POTASSIUM CARBONATE SOLUTION (CLEAR)
POUR INTO HEAVY JAR
LIQUIDS MIX TO FORM SOLID CHEMICAL

QUICK CHANGE—To turn liquids to solids, prepare two saturated solutions in boiling water, one with quick-lime (calcium carbonate) and the other with a fraction of an ounce of potassium carbonate.

WET INSIDE OF GLASS WITH MURIATIC ACID
WET INSIDE OF GLASS WITH AMMONIA SOLUTION
PUT GLASSES MOUTH TO MOUTH AND COVER WITH HANDKERCHIEF
BURN NEWS-PAPER, FAN SMOKE TOWARD GLASSES

CLOUD MAKER—Follow above directions to change small amount of smoke blown toward empty glasses into great white clouds.

UNCOVERED – HEAVY SMOKE WILL ARISE FROM EACH GLASS

NON-SINKING SUGAR—Put a little collodion in a glass dish, drop in lumps of sugar, stirring until the sugar is thoroughly saturated, then allow to dry. You now have sugar that looks all right, but floats and will not dissolve in the hottest of coffee.

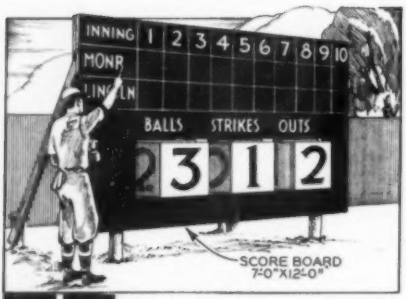
WHITE TO BLACK—Place a lump of sugar in a strong, tall glass jar; add enough hot water to cover the sugar, then add double this amount of strong sulphuric acid, stirring with a glass rod. In a few seconds the colorless liquid will turn brown, boil up like "Old Faithful," and finally fill the jar with a fluffy black mass—a surprise effect.

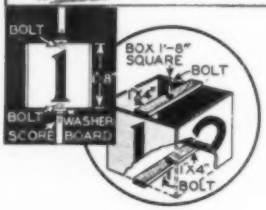
UNBREAKABLE BUBBLES—Bubbles can be bounced on felt hats without breaking! Make up a strong solution of Castile soap; for every pint of soap solution add one teaspoonful of glycerine. Bubbles blown with this mixture are impervious to shock.

LYCOPODIUM MAGIC—Place a large glass on the table in view of your audience. Fill with ordinary water, borrow a coin, and drop in. Challenge anyone to get the coin without wetting their hands. You can do it, if before the performance you had rubbed lycopodium powder thoroughly all over both hands up to the elbows. The powder is invisible; your hands will refuse to get wet.

WALKING ON FIRE—Dissolve ½ oz. of camphor in 2 oz. aqua vitae. Add 1 oz. mercury, 1 oz. liquid styrax, and stir solution until clear. Now add 2 oz. pulverized red stone, shake mixture, and allow to stand for 12 hours. This mixture, rubbed well on parts of your body which are subjected to flame, will allow you to demonstrate that you are invulnerable to fire. By treating your feet with the solution, you can walk barefoot over hot coals without getting burned.

SUMMER FUN PROJECTS



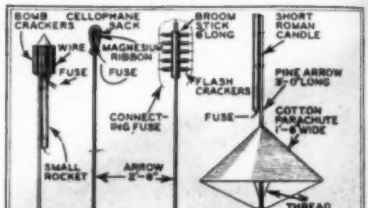


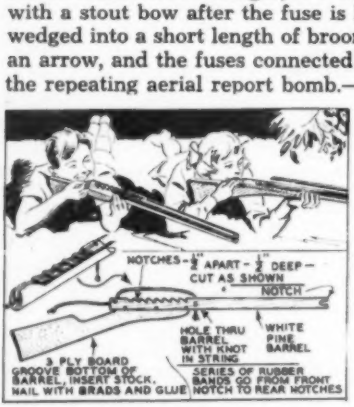
Score Board for Sand-Lot Ball Games

THE attendance at any neighborhood baseball diamond can be improved by this simple score board, built from packing boxes and scrap lumber. A board 8′x12′ in size can be seen even if set against the right or left field fence. Set two posts in the ground, 9′ apart and 8′ above ground. On these nail smooth, wide boards, leaving an opening 2′x8′ in size one foot above the lower edge, for the rotating ball, strike, and out counters. Brace the scoreboard from behind with 2″x4″ lumber. After applying a coat of flat black paint to the board, put in the permanent lettering with white enamel. The name of the visiting team and the scores at the end of each half inning are put in with a paste made from whiting.—R. M. Elk.

Shoot Fireworks With Bow and Arrow

ROCKET bombs for Fourth-of-July displays can be made at home by tying large firecrackers around the top of a skyrocket, and igniting rocket and cracker fuses at the same time. Magnesium flares, made as shown at the right, are shot high into the air with a stout bow after the fuse is lit. Flash crackers wedged into a short length of broomstick slipped over an arrow, and the fuses connected together, comprise the repeating aerial report bomb.—V. H. Everett.



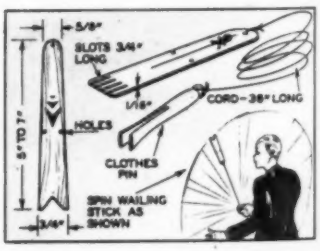

NOTCHES - 1/2" APART - 1/2" DEEP - CUT AS SHOWN
NOTCH
HOLE THRU BARREL WITH KNOT IN STRING
WHITE PINE BARREL
3 PLY BOARD
GROOVE BOTTOM OF BARREL, INSERT STOCK, NAIL WITH BRADS AND GLUE
SERIES OF RUBBER BANDS GO FROM FRONT NOTCH TO REAR NOTCHES

A String-Trigger Rubber Band Toy Gun

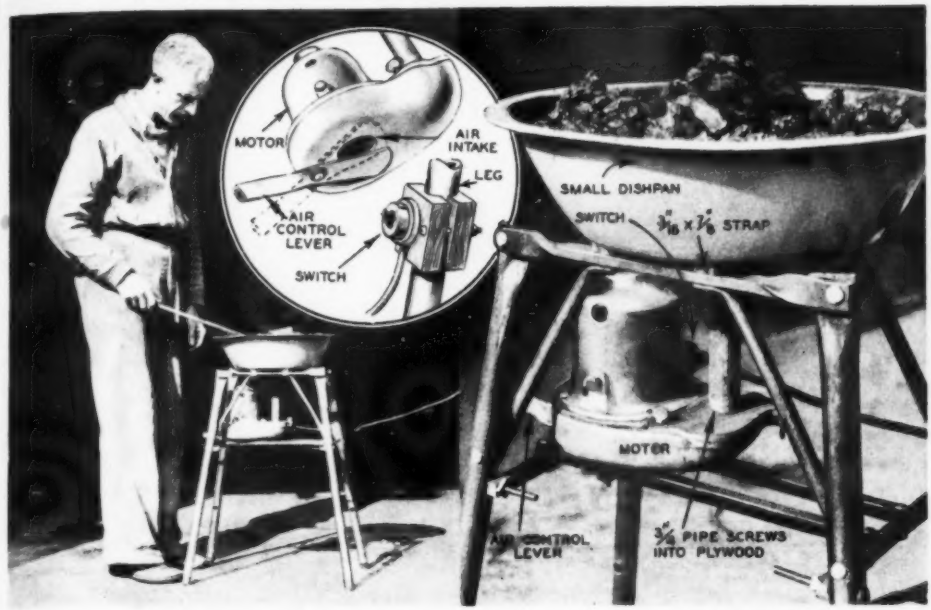
ONE after another, with surprising accuracy, rubber bands can be released from this toy gun, as the novel trigger string is pulled. The barrel is of white pine, with one large notch at the tip to hold all the rubber bands, and a series of notches, one for each band, near the stock. The trigger string lies over these notches. A gentle pull will release one band at a time; a strong tug will send off every band on the gun. Fly hunting is great sport with this rubber band toy gun, using inner tube bands as ammunition.—L. W. Coe.

Ghost Wailing Sticks Produce Weird Sounds

QUEER shrill sounds are produced when these wailing sticks are whirled around on a string at high speed, the tone deepening to a groan as speed is decreased. Plane down a board to $\frac{1}{16}$″ thickness, then cut out to one of the two designs shown. Slots or notches in the end of the blade change the tone. A clothespin serves as a convenient handle, a loop in the string turning freely in the groove near the end of the pin. Paint in gay colors and designs.—G. E. Van Horn.



Workshop Dishpan Forge Gets Air from Vacuum Cleaner



Simple, sturdy, and efficient is this homemade forge, which uses old vacuum cleaner for air supply. In circle are valve details.

THIS handy workshop forge, built from discarded materials, is capable of heating just about any size or shape of forging which will fit into the dishpan bed, and which can be covered with charcoal.

The leg members are cut from the frame of an old iron bed, the ends of the tubular pieces being flattened and drilled to take bolts. The diagonal braces are cut from the iron spindles of the bed, and likewise bolted in position.

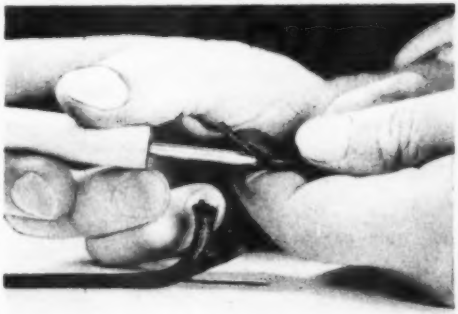
Remove the bag and suction funnel from an old vacuum cleaner, and make an air control by mounting on the motor a simple galvanized iron valve which will slide over the air intake. The blower unit is a section of ¾" pipe screwed into a panel of plywood which has been fitted over the motor assembly. This pipe extends two or three inches up into the dishpan.

The dishpan is bolted to the frame of the forge, and a toggle switch for controlling the vacuum cleaner motor is mounted on a wood block clamped to one leg.

Ordinary coal or coke will make a very hot blaze, but regular blacksmith's coal, if available, will give more uniform and faster heating. Start your forge fire with paper and wood shavings, adding coal carefully.

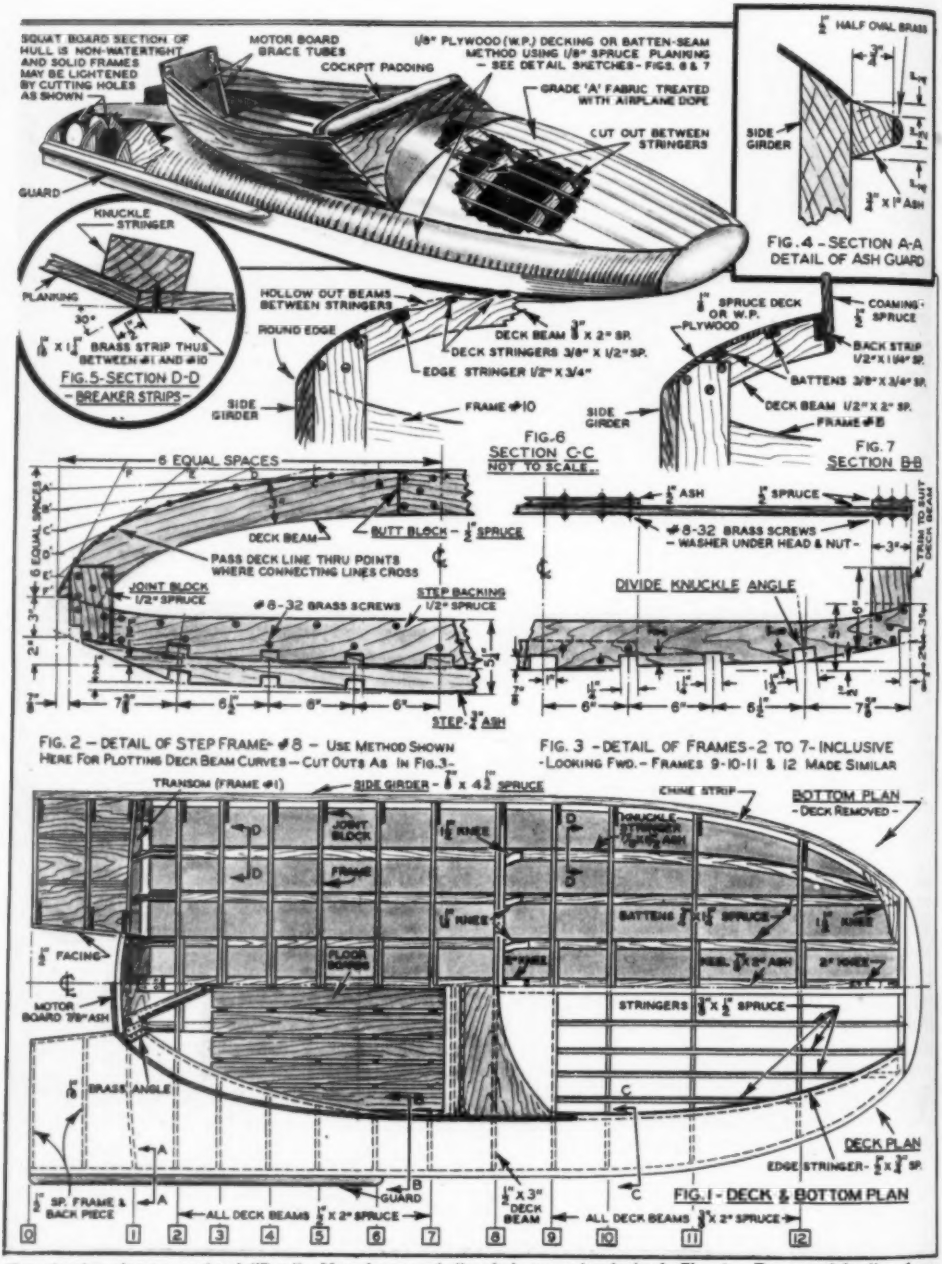
Tube Strips Insulation from Wire

TO STRIP the insulation from electric wire quickly and neatly, mount in a file handle a length of steel tube of a size which will slip over No. 12 or No. 14 house wiring. Sharpen the other end of the tube in the same manner as a wood gouge is sharpened. Pushed over the end of the wire, with a slight turning motion, this little tool will remove insulation cleanly. Use smaller tubing for No. 18 wire or for stranded wire used in radio work. One cutting edge of the tube should always be in contact with the wire.



Insulation is stripped off by pushing this tool over the wire.

Build "PEP"—a Class "C"


SQUAT BOARD SECTION OF HULL IS NON-WATERTIGHT AND SOLID FRAMES MAY BE LIGHTENED BY CUTTING HOLES AS SHOWN
MOTOR BOARD BRACE TUBES
COCKPIT PADDING
1/8" PLYWOOD (W.P.) DECKING OR BATTEN-SEAM METHOD USING 1/8" SPRUCE PLANKING — SEE DETAIL SKETCHES - FIGS. 6 & 7
GRADE 'A' FABRIC TREATED WITH AIRPLANE DOPE
CUT OUT BETWEEN STRINGERS
GUARD
KNUCKLE STRINGER
PLANKING
30°
BRASS STRIP THUS BETWEEN #1 AND #10
FIG. 5-SECTION D-D -BREAKER STRIPS-
HOLLOW OUT BEAMS BETWEEN STRINGERS
ROUND EDGE
DECK BEAM
DECK STRINGERS 3/8" X 1/2" SP.
EDGE STRINGER 1/2" X 3/4"
SIDE GIRDER
FRAME #10
FIG. 6 SECTION C-C NOT TO SCALE
SPRUCE DECK OR W.P. PLYWOOD
COAMING SPRUCE
BACK STRIP
BATTENS 3/8" X 3/4" SP.
DECK BEAM 1/2" X 2" SP.
FRAME #8
FIG. 7 SECTION B-B
HALF OVAL BRASS
SIDE GIRDER
ASH
FIG. 4 - SECTION A-A DETAIL OF ASH GUARD
8 EQUAL SPACES
DECK BEAM
BUTT BLOCK - SPRUCE
PASS DECK LINE THRU POINTS WHERE CONNECTING LINES CROSS
JOINT BLOCK 1/2" SPRUCE
#8-32 BRASS SCREWS
STEP BACKING 1/2" SPRUCE
STEP - ASH
#8-32 BRASS SCREWS - WASHER UNDER HEAD & NUT -
DIVIDE KNUCKLE ANGLE
FIG. 2 - DETAIL OF STEP FRAME - #8 - USE METHOD SHOWN HERE FOR PLOTTING DECK BEAM CURVES - CUT OUTS AS IN FIG. 3-
FIG. 3 - DETAIL OF FRAMES - 2 TO 7 - INCLUSIVE - LOOKING FWD. - FRAMES 9-10-11 & 12 MADE SIMILAR
TRANSOM (FRAME #1)
SIDE GIRDER - SPRUCE
CHINE STRIP
BOTTOM PLAN - DECK REMOVED -
JOINT BLOCK
FRAME
KNEE
KNUCKLE STRINGER
BATTENS
FACING
FLOOR TIMBERS
MOTOR BOARD BRACE ASH
STRINGERS
BRASS ANGLE
DECK PLAN
EDGE STRINGER
GUARD
SP. FRAME & BACK PIECE
ALL DECK BEAMS 2" SPRUCE
DECK BEAM
FIG. 1 - DECK & BOTTOM PLAN

Top drawing shows completed "Pep." Note how parabolic deck curve is obtained, Fig. 2. Draw straight line from A to A', B to B', etc. Plot curve through points where lines F and E, E and D, etc., intersect. Study these drawings.

Outboard RACER

Here is a trim hydro that will be a winner everywhere. It is not difficult to build from the drawings and text. Powered with a good motor "Pep" is bound to be out in front in class "C" races.

by **SAM S. RABL**
Naval Architect

When "Pep" is ready for water, start out slow until you learn to handle her. Experiment with placing of the fin and motor mount.

NOT so long ago almost any cracker box powered with a motor powerful enough would get out and win races in the outboard-powered field. With the advent of so many motors from which the manufacturers are pulling every ounce of power, and the difference between the various makes so small, it is now the boat that is winning the races. The boats have undergone some radical changes in the last few years and to keep the double M family up to date we have designed the *Pep*.

One of the first things you will want to know is just how fast she will go. This is one of the hardest things to answer in connection with an outboard boat. The builder of the boat and the motor are two variable factors, but given half a chance *Pep* will be out there in front with the rest of the boats. The question of speed is up to you; build her carefully and power her with the best class C motor that you can buy.

The construction of *Pep*, while not exactly as simple as that found in the ordinary row boat, is not complex. The important thing to bear in mind is to get good substantial and tight joints and by all means get both sides alike. At the present speed of the outboards a little difference in dimensions of either side will make steering very erratic.

The frames (Figs. 1, 2 & 3) are made from ½" spruce. At the center they are reinforced with a piece of ash ½"x2" thirteen and a quarter inches long. The after frames are cut from a board five inches wide, the forward ones from a board six and three-quarters wide. All joints are made with No. 6-32 brass machine screws with washers under the head and nut. Paint the surfaces of all joints with white lead before assembly.

The side girder is made from a piece of spruce ⅞" thick and 4½" wide. It is bent in with edges square and shaped when the planking and deck are fitted. The forward ends will have to be soaked in hot water or steamed to facilitate bending.

The keel is of ⅞"x2" ash and is in two pieces separated at the step. The constructional profile, Fig. 8, shows this division clearly. The keel is placed in the boat square and beveled to fit the planking. The knuckle

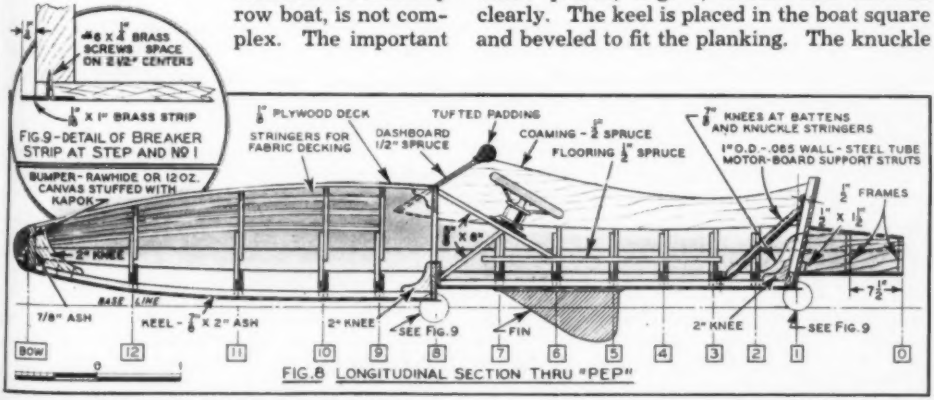


FIG. 8 LONGITUDINAL SECTION THRU "PEP"

Here is a cross-section view of "Pep." Craft aft of transom is not watertight. The breaker strip, Fig. 9 aids in allowing water to break away from corner reducing wet surface and friction. Steering wheel and fin are standard marine hardware.

Offset Table Gives Dimensions of All Stations on Class "C" Hydro

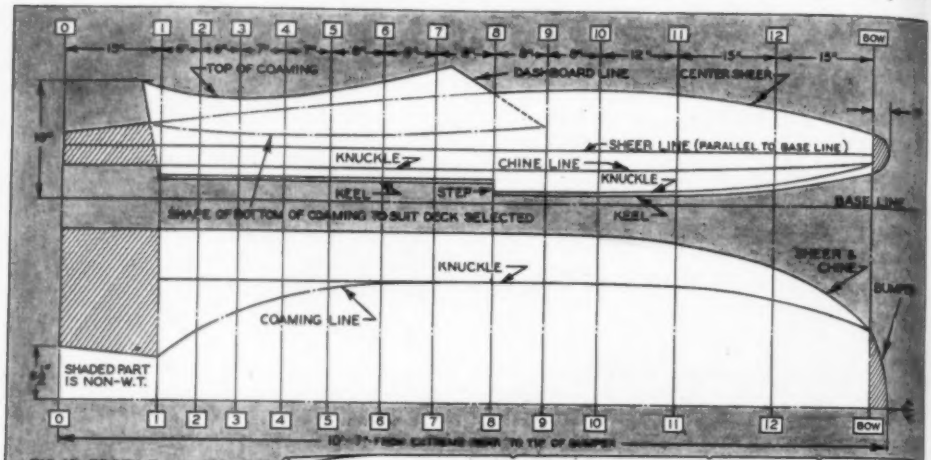


FIG. 10 - PROFILE AND HALF-BREADTH LINES OF "PEP"

Three plan views are shown in Figs. 10 and 11. Variation between stations is so small that in some cases stations could not be shown in body plans. Get dimensions from offset table at right. Stations that are alike are shown as "straight."

	WIDTHS FROM CENTER LINE												
STATION	0	1	2	3	4	5	6	7	8	9	10	11	12	BOW
SHEER & CHINE	2-2-2	← STRAIGHT →							2-2-2	2-2-1	2-1-4	2-0-14	1-9-4	1-0-0
KNUCKLE	1-6-8	← STRAIGHT →							1-6-8	1-6-8	1-6-1	1-4-3	1-0-0	
COAMING LINE		0-7-0	0-10-15	1-1-11	1-4-1	1-5-6	1-6-2	1-6-7						
	HEIGHTS FROM BASE LINE								STEP					
KEEL		0-3-0	← STRAIGHT →					0-3-0	0-1-4 0-3-0	0-1-4	0-1-4	0-1-6	0-2-6	0-5-2
KNUCKLE		0-3-8	← STRAIGHT →					0-3-8	0-1-12 0-3-8	0-1-12	0-1-12	0-1-15	0-3-3	0-8-10
CHINE	0-5-0	← STRAIGHT →							0-5-0	0-5-3	0-5-12	0-6-10		
SHEER	0-8-0	← STRAIGHT →												0-8-0
CENTER SHEER	0-9-12	0-11-7	1-0-3	1-0-14	1-1-11	1-2-8	1-3-6	1-4-1	1-4-11	1-5-0	1-5-3	1-4-14	1-2-10	0-11-0
COAMING TOP		1-4-11	1-3-9	1-3-2	1-3-6	1-4-6	1-6-2	1-8-2						

DIMENSIONS ARE IN FEET, INCHES, AND SIXTEENTHS TO INSIDE OF PLANKING

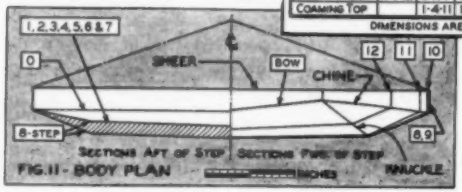


FIG. 11 - BODY PLAN

stringers are of ash ⅞"x1½" and are set in the frames in such a manner that their center bisects the knuckle angle (Fig. 3). They are shaped to fit the planking when it is applied.

The seam battens are of spruce ¾"x1¼" spaced six and twelve inches away from the longitudinal centerline of the boat. They are set in notches with their faces along the line of planking and require no beveling after fitting. (Figs. 2 & 3).

The bow piece is made of ⅞" ash and is beveled to suit the lines of the deck, side girders and the bottom. This should be a piece that has almost perfect grain. The step frame (Fig. 2) is similar to the other frames with the exception that the lower part is made in two thicknesses to allow the break in the planking that forms the step. The deck beam at this point is heavier also to take the mounting of the steering wheel.

The transom frame is constructed from one-half inch spruce. The motor blocks of ⅞" ash are placed in the center as shown with the grain in a vertical position. A ⅞"x2" spruce batten is placed on the bottom to take the planking forward and a batten ½"x1½" is placed aft of the frame to take the squat board planking. The knees of the seam battens and knuckle stringer form the upright framing across the boat.

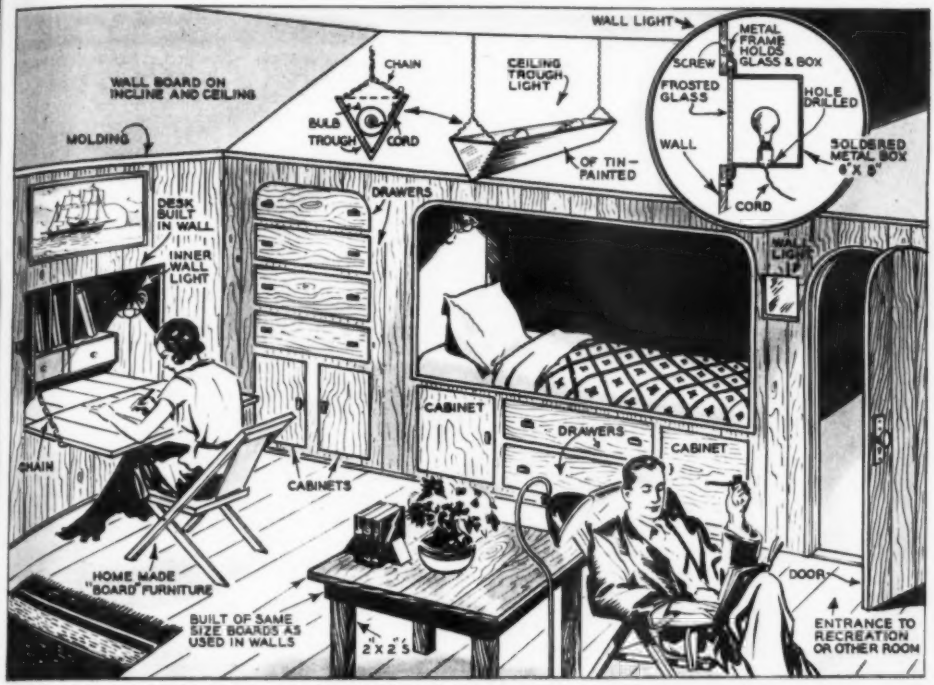
All of the frames aft of the transom are made of single boards of ½" spruce. As this part of the boat is not watertight, these frames may be lightened with large holes jigsawed in their surfaces. Only sufficient material to take the fastenings is required around the edges.

After all parts are complete the hull is assembled bottom up on a suitable frame or table constructed so that the hull is at a convenient distance above the floor. All joints are screw fastened, brass screws being preferred.

All knees throughout the boat should be made from natural crook hackmatack or oak; if these are not obtainable they may be cut from plank stock of the thickness specified. The grain should run along the knee from

[*Continued on page* 118]

For Your Attic—Attractive Built-Into-the-Wall Furniture



In this artist's sketch are dozens of worth-while ideas for refinishing your attic as a recreation room, den, or extra guest room. Most of the furniture can be built into the walls, to eliminate sloping ceilings and give that much desired air of coziness. Desk folds up into wall when not in use, to provide room for extra tables. Even radio, fan, and radiators can be recessed in walls.

IF THOSE sloping ceilings have kept you from remodeling your attic as a recreation room or den, consider this idea. Build new walls for your attic, far enough in from the house walls to give an 8½-foot or higher ceiling all over the room.

At least one side of the attic is usually high enough to permit installation of regular 8-light windows, with a window seat below.

Make the bunk large enough to hold a three-quarter size mattress and spring, and enclose it with the same material as you use on the walls of the room. Straight, wide boards run vertically and finished with clear lacquer give a cheery Colonial atmosphere to the room. Old dressers may be set right into the walls, and boards run alongside the drawers as shown. Thin pieces of wood should be glued over the drawer faces.

Modern lighting, either in the form of recessed lights in the walls, or the reflector type lights hung from the ceiling, will add a final touch of distinction to your attic den.—Home Improvement Contest Winner.

Automatic Catch Holds Up Window

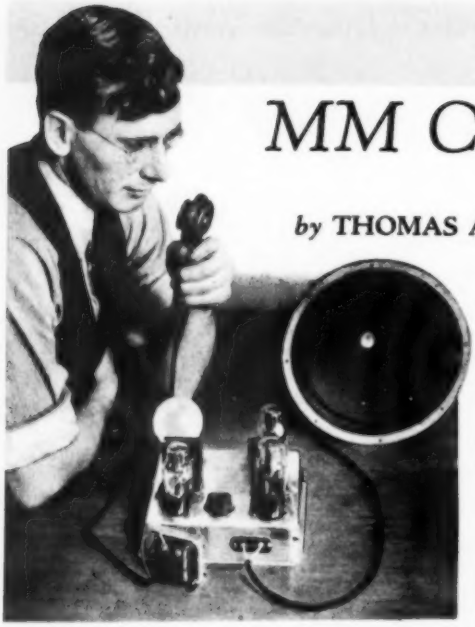
FOR windows which have no sash weights, or those where the sash cord has broken, this automatic catch will eliminate the need for props. A cam-like disc with an extension arm at one end is cut from plywood with a scroll saw, and mounted off center on the window sash with a single wood screw. If the catch is loose enough to swing freely, it will automatically grip the window frame. A push on the catch will release the cam. One cam will be sufficient for ordinary windows; where two are used, they must be adjusted to grip the sides of the window frame together.

Simple automatic window catch.

RADIO

MM Caketin Amplifier

by THOMAS A. BLANCHARD



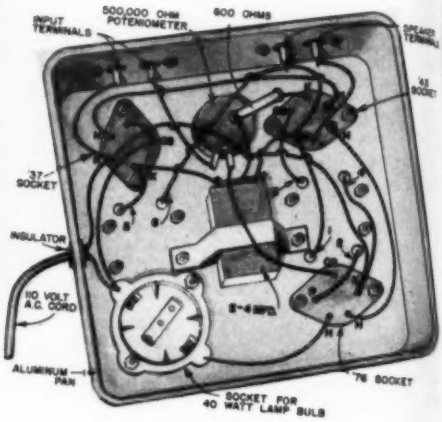


Photo at left shows MM caketin amplifier connected as midget public address amplifier. Volume control is between front tubes. With carbon microphones a transformer is necessary. Generally a three-volt battery, in series with microphone, will be sufficient. (Battery not shown.) Bottom view of cake in, above, shows all connections. Top view is on opposite page.

LOW cost and simplicity are the features of this compact little caketin amplifier. Most of the parts are obtained from old battery radio sets. Containing two stages of audio amplification, this amplifier may be attached to one tube receivers or even good crystal sets to bring in stations with loudspeaker volume, or may be used with the larger all-wave receivers to amplify elusive DX signals. While not suited for commercial public address work, because of its low output, it will be satisfactory for small gatherings, if used with a high output telephone microphone.

The circuit is one which will give maximum output without distortion, yet have a minimum of parts and operate directly from a 110-volt power line, either A.C. or D.C. All of the tubes are of the latest automotive type, having six-volt filaments connected in series. By including a 40-watt house lamp in the filament circuit, the tubes are operated from line voltage, with no power transformer.

Plate current is obtained from the power line directly, and is rectified by a '37 tube having plate and grid elements tied together. Any audio transformer having primary and secondary windings connected in parallel may be used as a filter choke. A double 4-4 mfd. electrolytic condenser serves as filter capacity, the entire power pack unit delivering more than 80 volts of practically pure direct current.

In the first stage is a type '76 tube with direct grid coupling, which feeds into an audio transformer. The output tube is the powerful type '43 pentode.

To simplify the construction of this amplifier, input and output transformers have been omitted from the circuit. If required for any particular purpose, as with a carbon microphone or a special low impedance speaker, they may be connected externally.

A phonograph pickup or any high impedance microphone may be connected directly across the input terminals of the amplifier. With carbon microphones the correct size of microphone transformer and battery must be used. High-gain telephone microphones, which usually can be picked up at a local telephone company shop, will work best with this set. Ordinary carbon microphones do not have a high enough output for this cir-

SPARKS
Is All-Electric

cuit. A magnetic speaker is plugged into the output terminals.

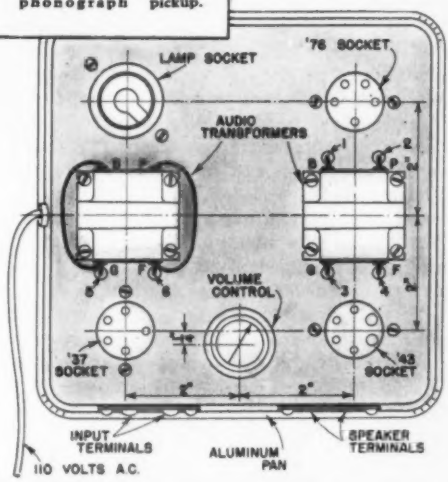
To test the completed amplifier, connect a pair of radio headphones to the input terminals and a speaker to the jacks. If everything is assembled correctly, the speaker will amplify your voice as you speak into one of the headphones.

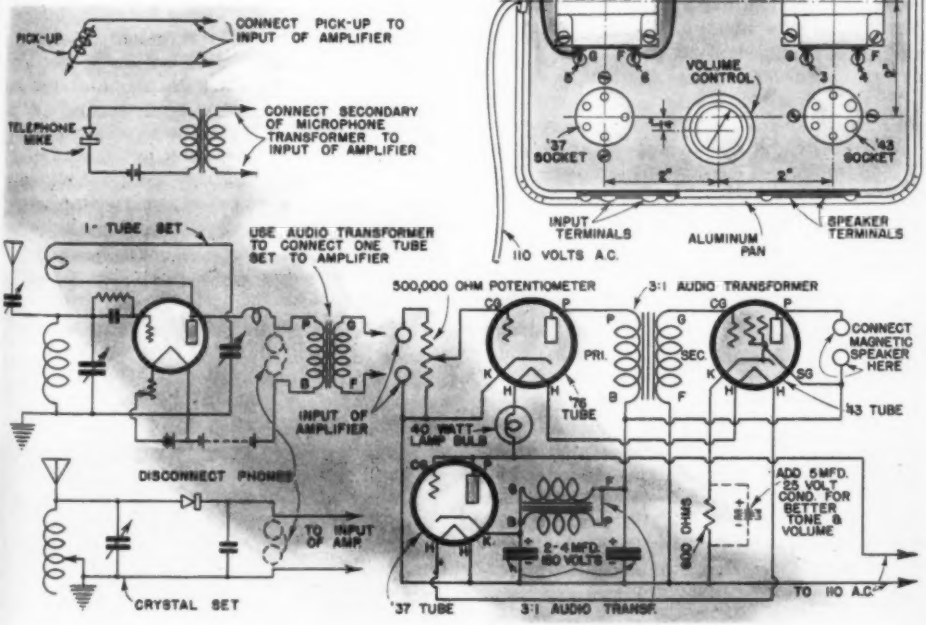
In some cases the volume and tone will be greatly improved by connecting a 4 or 5 mfd. condenser across the 600 ohm carbon resistor connected in series with the cathode lead of the '43 tube.

The audio transformers need not be new. Those from old battery radio sets will work well here, regardless of their ratio.

A dynamic speaker may be used with this amplifier simply by replacing the filter choke with the field winding of the dynamic speaker. The voice coil windings would go to the speaker jacks through the proper size of output transformer for the speaker used.

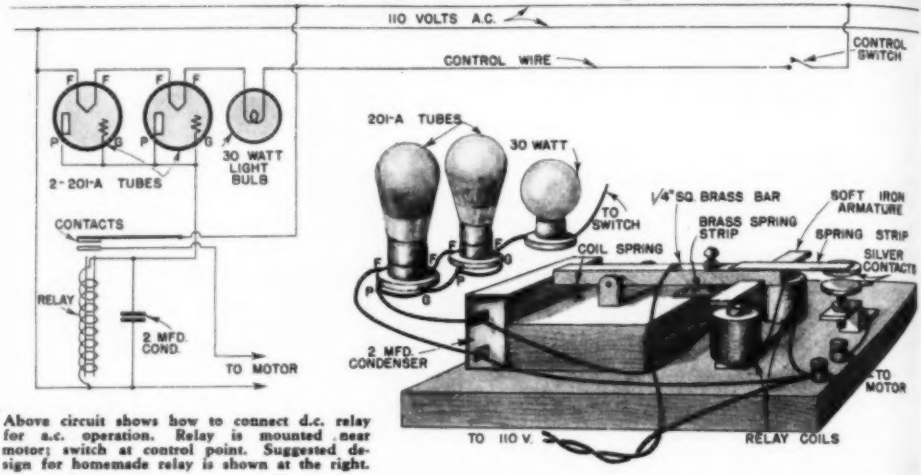
Amplifier is connected above for use with phonograph pickup.





Circuit diagram for amplifier is shown at right. Diagrams at left show how to connect phone pickup, mike, and radio sets to amplifier. Success of this amplifier will depend greatly upon matching of whatever microphone is used to the input stage.

All-Electric Power Relay Starts, Stops Distant Motors

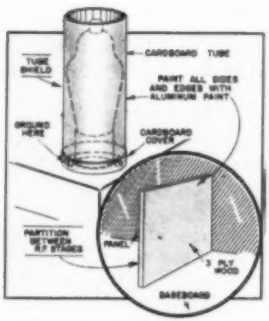


Above circuit shows how to connect d.c. relay for a.c. operation. Relay is mounted near motor; switch at control point. Suggested design for homemade relay is shown at the right.

MOTOR-GENERATOR units of transmitters, signs, and other electrical apparatus can be controlled from points hundreds of feet distant with this simply constructed heavy duty relay. If both relay and motor get their power from the same alternating current source, only a single control wire is required.

An ordinary low current d.c. relay can be used, as the two vacuum tubes connected in parallel act as a half-wave rectifier. Any chattering of the relay which might be caused by the pulsating rectified current is eliminated by connecting a filter condenser across the relay coil. A filament transformer may be used in place of the 30-watt lamp to supply filament current. Use dime-size silver contacts on a homemade relay.

Shield Tubes With Aluminum Paint

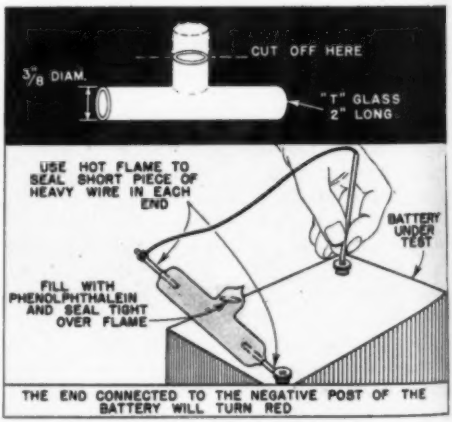


Cardboard of any shape, sprayed with aluminum paint and grounded, makes efficient shields.

BY spraying or painting aluminum paint on either paper, wood, or glass, a conducting layer is formed which permits any of these materials to be used for tube shields. Large pieces of cardboard will serve as partitions between stages of your radio.

Make a Chemical Polarity Tester

POLARITY can be checked on lines carrying as high as 180 volts d.c. with this simple chemical-filled glass tube. The liquid will turn red at the electrode which is connected to the negative side of the line, but remain unchanged on the positive side. Copper wire electrodes are sealed into the ends of a T-tube, and the entire tube then filled with phenolphthalein, a chemical obtainable at any drugstore. Fill to within ½-inch of the tope of the tube. The phenolphthalein crystals should be dissolved in a dilute acid solution. Experiment with different concentrations before sealing the tube.

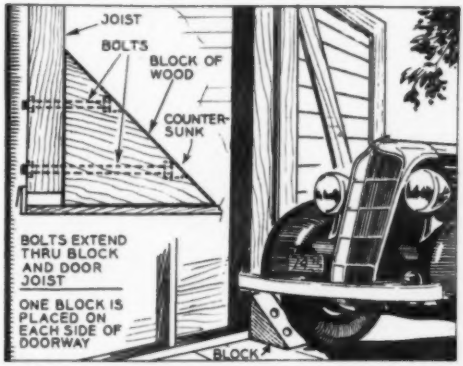

CUT OFF HERE
3/8" DIAM.
"T" GLASS 2" LONG
USE HOT FLAME TO SEAL SHORT PIECE OF HEAVY WIRE IN EACH END
BATTERY UNDER TEST
FILL WITH PHENOLPHTHALEIN AND SEAL TIGHT OVER FLAME
THE END CONNECTED TO THE NEGATIVE POST OF THE BATTERY WILL TURN RED

Interesting as well as efficient is this polarity tester. Solution in one end changes color when current passes through, to indicate polarity. Form glass tube in bunsen burner flame.

IDEAS FOR AUTO OWNERS

Garage Door Chocks Save Fenders

TO SAVE wear and tear on the fenders of your car while others are backing it into the garage, cut wooden chocks which can be bolted to the door joists on each side of the entrance. While these chocks will not harm the tires even if the car is driven over them, they will warn the driver that the car is too far to one side. The size of the chocks will depend upon the width of the door and the car—the ideal size is that which will just allow the car to get in without touching either chock.—Kenneth Murray.

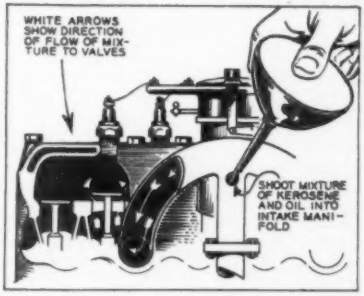


Loosen Inner Tube Patches With Heat

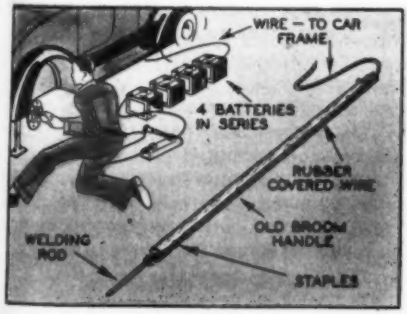
DEFECTIVE inner tube patches can be removed in a few minutes by taking advantage of the fact that patching cement will burn. Simply apply a thin coat of the patching cement to the surface of the patch, being careful not to get any on the inner tube itself. Ignite this cement with a match. When the flame has died down, the patch can be peeled off easily, without damaging the inner tube. The heat penetrates through the old patch and softens the old cement. A larger patch can then be applied.—Albert Machida.

Quick Remedy for Sticking Auto Valves

INTAKE valves of auto engines will sometimes stick in cold weather, especially if heavy oil is used in the crankcase. The trouble can be cleared up in a few minutes by disconnecting the windshield wiper tubing from the intake manifold, and squirting into the manifold with an oil can a mixture of kerosene and thin oil. This solvent oil, drawn through the valves by the engine, will thin out the heavy or gummy oil around the valves stems. The tubing is of course replaced.—Alex Adastik.



Handikink Removes Broken Axle

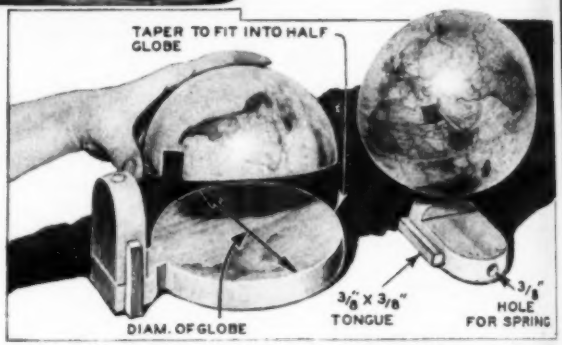


TO remove a rear axle which has broken off far back in the housing, try this welding method. Drive a short length of ⅛" welding rod into the end of a broomstick, and connect to storage batteries or a welding generator, grounding the other terminal to the car frame. Push the broom stick into the housing until the rod touches the end of the broken axle. The surge of current will weld rod and axle together. Open the switch instantly. The axle can now be removed by pulling out the broomstick.—Vernon Tracey.

After-Dinner Projects fo

Each of these three projects—the electric candlestick, globe book-ends, or locomotive toy chest, can be completed in one evening with ordinary workshop tools and a wood-turning lathe.

Finished globe book-ends, shown above, automatically adjust themselves when books are taken out. Construction of sliding ends is shown at right. Drill holes lengthwise in each for the spring, which is six inches long, wound from No. 22 music wire with hook ends.



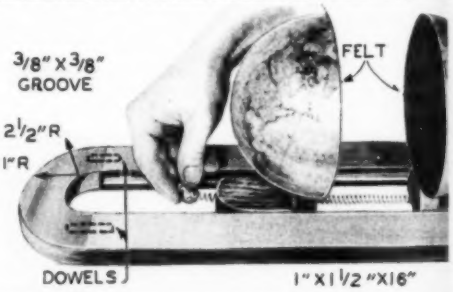
THE combination of a globe with a self-adjusting book-end design is an attractive addition to the library or study table, yet simple and inexpensive to build. Spring-controlled, the globe ends spread apart or move together automatically to support one book or a dozen, yet never tip over.

Make the slide frame first, from clear-grained oak or birch. The curved end pieces are most easily fastened to the side pieces with dowels; do not glue these until the slides are completed.

Obtain a pasteboard globe about six inches in diameter, and cut it in half on the 30 degree meridian. Cut out the two book-end pieces to fit into each half of the globe.

Wood blocks with tongue pieces are next cut and fastened to the book-ends. These should slide smoothly inside the grooved frame.

The frame can now be glued around the slides, and felt glued to the faces of the book-ends. Apply stain and varnish, then wax the slides if necessary to get smooth action.



Above photo shows how book-ends slide inside frame, coil spring pulling them together as books are removed. Stain wood to desired color, then varnish or lacquer and rub down with fine steel wool. Rub graphite or wax into the grooves.

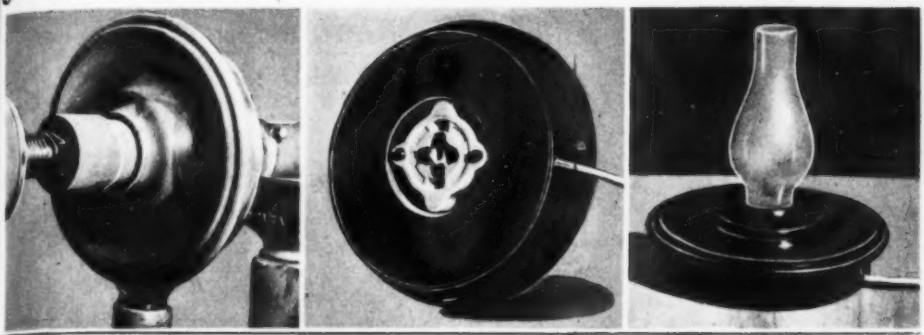
Candlestick Uses New Bulb

Utilizing a new type of electric bulb sold in the larger department stores, the electric candlestick suggests an old-fashioned candle sconce. As a night light on the dresser it will be appropriate in any bedroom.

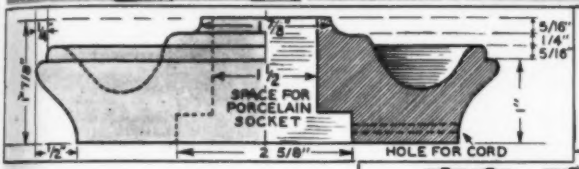
The base is turned from a block of gum-wood two inches thick and seven inches in diameter. If the wood is open grained, sand carefully, rub down with steel wool, then fill the pores with wood filler which has been darkened with stain. Rub down again with steel wool after the filler has dried, and remove the base from the lathe. Turn it upside down in a shallow pan, drive a small nail in the bottom to lift by, then pour clear lacquer over the sides as rapidly as possible.

Allow the first coat of lacquer to dry for

for the Home Workshop



Photos show how candlestick base is mounted on wood spindle while being turned down in lathe, how socket is recessed into base, and the completed lamp. Low wattage electric bulbs can now be obtained in the unique shape shown here, which is ideal for novelty candlesticks.



Dimensions of candlestick base are given above. Greatest diameter of base is 7 inches. Bore 1½" diameter hole through block first, then fit on slightly tapered wood spindle which has been turned down in lathe. No faceplate is needed. Turn recess for the socket last.

several hours, then reinsert in the lathe and rub lightly with the finest grade of steel wool. Repeat the lacquering and rubbing down process. Polish with a clean, hard finish cloth while the lathe is turning at high speed.

Mount the socket, attach the light cord, screw in the bulb, glue a piece of felt over the bottom, and your candlestick is ready for use.

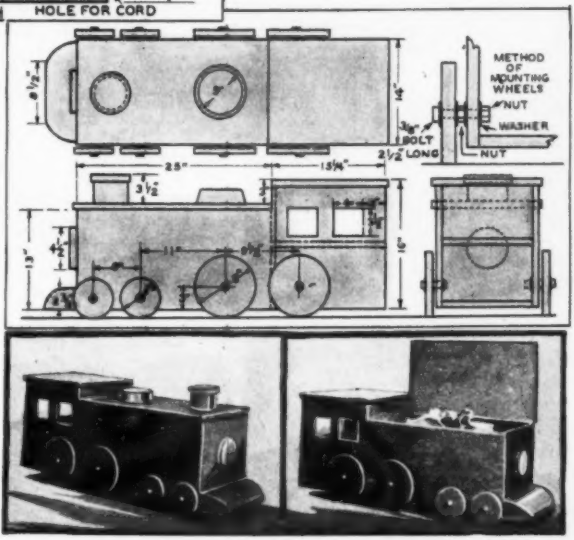
Locomotive Is Toy Chest

Either ¾" fir plywood or plain boards may be used in building the locomotive toy chest. Lay out the sides carefully, cutting out the openings by drilling holes with an auger bit, then finishing with a sharp chisel. Assemble with screws and brads. The chest cover may be attached with one long hinge or with three small hinges.

The wheels may be turned on a lathe or cut on a bandsaw, from ¾" stock. First drill the ½" holes, then use a ½" dowel as a pivot to obtain a true circle on a bandsaw.

Wheel bushings are made by hammering a ¾"x1-5/16" piece of 16-gauge copper around a ⅜" rod, then cutting off sections and driving into the wheel holes. The axles are ⅜" machine bolts 2½" long, the threads of which are extended to within an inch of the head.

Bright colors always appeal to children. Stain the sides, cab, and inside brown, and finish the cow-catcher and cab top with bright red enamel. Wheels, steam dome, and other fittings can be a bright green. Place a screw eye on the cow catcher, to which a pull rope can be attached.



Children enjoy pushing this toy chest locomotive around the house each evening at bedtime, gathering up the toys in each room. Line up wheels carefully. Older children will want to tow the engine with a tricycle.

With the COLLECTORS

WAR

SUBWAY

ARCTIC RESCUE

DESERT

Arthur Anderson, of Webster Groves, Mo., (above) collects match covers. His 10,500 different covers are filed in alphabetical order under 32 classifications, in homemade plywood filing cabinets. Over 2100 of packets came from restaurants.*

STAMPS OF THE DAY

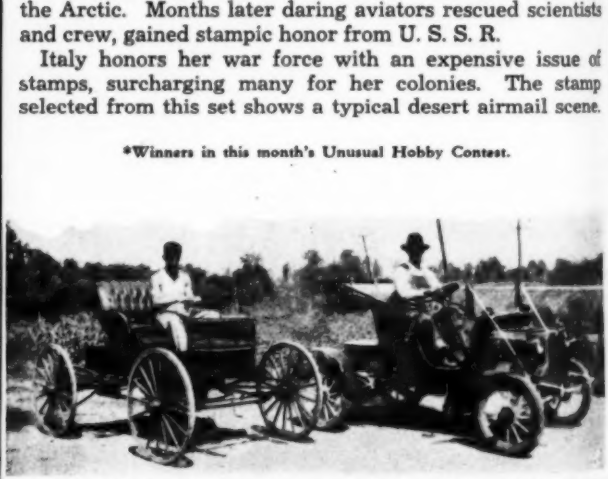
STAMPS make as well as commemorate history. On this page is the 1924 Paraguay map stamp, claiming Gran Chaco, that kindled the war spirit, and the 1927 Bolivian stamp, also claiming the region, that started a war between these two countries which today is still unsettled.

Moscow finishes her subway; U. S. S. R. commemorates the great event with strikingly beautiful stamps, two of which are at the left.

Soviet icebreaker Tcheluskin was crushed by bergs in the Arctic. Months later daring aviators rescued scientists and crew, gained stampic honor from U. S. S. R.

Italy honors her war force with an expensive issue of stamps, surcharging many for her colonies. The stamp selected from this set shows a typical desert airmail scene.

*Winners in this month's Unusual Hobby Contest.



Collecting old one and two cylinder automobiles is the out-of-the-ordinary hobby followed by Lester Fuqua of Fortville, Ind. At left is an 1899 Lincoln, oldest in the group; next to it is a 1905 Reo. These cars still run.*

The Latest in DRILL PRESSES

—with Bridge-Trussed Frame

"WIZARD" TOOLS

These are the two most modern Drill Presses and embody several new features that add convenience and precision. The frame of the "Wizard" Drill Press is bridge-trussed, designed oversize, making it extremely rugged, rigid and trouble-free. Special Navy bronze is used for all bearings. This press will drill metal, wood, ivory, Bakelite and plastics. May be used for routing, mortising and inlaying when using proper bits and spindle lock. Table raises or lowers and is clamped by a simple handle. The quill can be locked at any point. It is graduated in sixteenths and has large pointer indicating depth of hole. Drills to center 14⅜" circle. Height over all 25½". Fully described in our catalog.

$14.50
Less Jack-Shaft (No. 1214)

7 Speeds

America's outstanding values in Drill Presses

Built for a lifetime of service

$14.90 Less Motor No. 1214M

Precision-Built Machines for Home and Professional Use

"Wizard" and "Wood Wizard" Power Tools are built of highest quality materials, by precision methods. Manufactured on straight line-production basis, permitting lowest prices.

$2,000,000.00 worth of Power Tools sold by HERBERTS

"WIZARD" and "WOOD-WIZARD" Power Tools are nationally advertised and nationally distributed. More than $2,000,000.00 worth sold. Your hardware dealer will supply you.

"WOOD-WIZARD" Bargains

- **JIG SAW**—10" & 14" capacity
- **SAW TABLE**—6", Bronze bearing, Tilting
- **SAW TABLE**—7" & 8", universal ball bearing
- **BAND SAW**—9", bronze bearing, Tilting Table
- **BAND SAW**—12", ball bearing, Heavy Duty
- **WOOD LATHE**—7"x30" & 9"x44", bronze bearing
- **WOOD LATHE**—11"x50", bronze bearing
- **WOOD LATHE**—10"x50", 12"x50", ball bearing, H. D.
- **JOINTER**—4", ball bearing, Auto Index
- **BELT & DISC SANDER**, Combination
- **SHAPER**—10" & 14", ball bearing
- **POWER HACK SAW**—3"x3" capacity
- **GRINDER & BUFFER**—Combination Type

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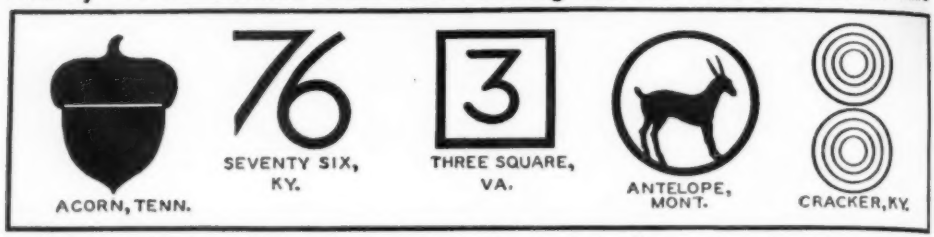
Many U. S. Towns Use Interesting Local-Color Postmarks



In addition to cancelling letters with names of towns, certain postmasters use designs like those above, illustrating name of town.

COLLECTING picture and number postmarks on letters from unusual-name towns is a fascinating sideline of philately. Collectors locate in an atlas or the Postal Directory towns having queer names, then send stamped, addressed envelopes to the postmasters of these towns, asking that these be cancelled and mailed. In most cases unusual "local-color" postmarks will be applied.

Towns having numbers for names are: Zero, Six, Eight, Sixteen, Seventeen, Twenty-six, Forty Four, Fiftysix, Seventy Six, Eighty-four, Eighty Eight, Ninety Six, Hundred, and Million.

George W. Hester, P. O. Box 94, Morristown, N. C., offers to obtain unusual postmarks for MM readers. Send a bunch of stamped, addressed envelopes and a few stamps for forwarding postage to him, placing commemorative stamps on your letter.

ADLETS FOR HOBBYISTS

STAMPS

YOU'VE tried the rest—now get the best! "Challenge Collection" including Cape Good Hope, triangle, only existing octagonal stamp, etc., 10c with approvals. Free Airmail Collection and additional premiums to regular customers. Comparison proves conclusively the superiority of "Bargain Stamp Service." 1332 South Hope. Los Angeles, California.

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GET your stamps absolutely free! Earn 40c every time. Plan together with free stamps sent for 10c. Your 10c to be credited to you at once. First offer of its kind ever made! United Collectors' League, Junior Dept. X, New Hyde Park, N. Y.

ZANZIBAR—Also Sudan—Somaliland—Tigerstamps—Togoland—Caribbean Archer—Algerian—Centralamericans—Britishcolonials—This magnicarocious collection free for 5c postage. Graystampshop, Dept. MM, Toronto, Canada.

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105 Different, Guinea, Congo, Hyderabad, etc., 3c to approval applicants. Extra—Airmail Set free with above. Hunziker, Box 225-F, Minneapolis, Minn.

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40 DIFFERENT U. S. Stamps cat. value $4.00—25c. Ray Erick—2402 4th., Hibbing Minn.

800 U. S. Including commemoratives, 25c. Stamp Mart, Storm Lake, Iowa.

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12,000 MILE TUNING RANGE

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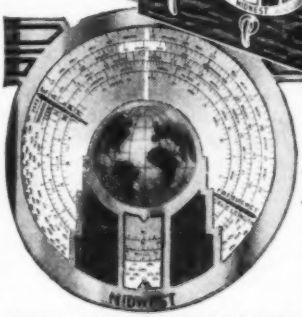

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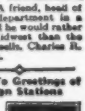
Department Store Executive Says Midwest Is Better Than Sets He Sells

Vineland, Ont., Can. — I have received many foreign stations including GSE, London, EAQ, Madrid. A friend, head of a radio department in a store, said he would rather buy a Midwest than the make he sells. Charles R. Ingraham.

Thrills To Greetings of Foreign Stations



Safford, Arizona — It's a real thrill to listen to my Midwest, to hear a voice from a far off land say: "This is the voice of the Pacific, VK2ME, in Sydney, Australia." or, "We take you now to Westminster Abbey," ... etc. Franklin H. John, P. O. Box 244.

Only Midwest Gives You Multi-Function Dial

This dial was designed in keeping with the trend of the times, yet is not an airplane dial! It is a many-purpose dial that performs many functions. Now, Midwest guarantees that inexperienced persons can secure good foreign reception. Send for FREE miniature of actual rotating dial which clearly shows these outstanding advantages:

1. **Dial calibrated in Kilocycles, Megacycles and Meters;**
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5. **Simplified Tuning Guide Lights;**
6. **Automatic Select-O-Band Indicator;**
7. **Illuminated Pointer Indicator;**
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All 5 Wave Bands enable you to enjoy today's finest High Fidelity American programs. In addition, you get Canadian, police, amateur, commercial, airplane and ship broadcasts and derive new delight and new excitement from unequalled world-wide broadcasts... England, France, Germany, Spain, Italy, Russia, Australia, etc. Send today for money-saving facts!

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This bigger, better, more powerful, clearer-toned, super selective, 16-tube radio gives you absolute realism—assures you of life-like, crystal-clear tone—unlike anything you have ever experienced before. You will hear one more octave—overtones—that cannot be brought in with ordinary radios. Now, hear every instrument, every voice, every shade and inflection of speech.

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Build "Pep" — A Class "C" Racer

[*Continued from page* 106]

point to point and not parallel to either of its sides.

The deck beams are of spruce of the dimensions shown on the plan they are joined at the center so as not to get cross grain at their ends where the heavy curvature occurs. All deck beams and framing are fitted after the bottom is planked and the hull turned over.

Bottom Is Most Important

In all racing hulls the bottom is the most important part. The builder may depart from the deck shown on the drawing and use any other method of decking that he may prefer. The deck may be made as a simple roof type with all lines running straight from the center sheer to the side if preferred. This roof type permits the use of waterproof plywood construction as no compound curvature is encountered.

In the curved type the curvature is a parabolic curve laid out by dividing the height from the sheer line to the center into six equal spaces. The half beam is divided similarly and a curve is drawn through the intersections of lines connecting these points as shown in Fig. 2. As all curves belong to the same family and the center and side sheers are fair, the whole deck is automatically faired without the use of any fore and aft lines. Beams in the way of the cockpit should be made whole and cut out to suit the coaming later.

Seam Batten Used on Deck

Where the curved type of deck is used it is constructed by the seam batten method using $\frac{1}{8}$" spruce. In some places where heavy curvature occurs the bend in the deck planking may have to be gotten out of a heavier plank hollow planned to the curvature. On the heavy part of the curve the planks should not exceed three inches in width. The battens behind the seams should not be over $\frac{3}{8}$"x$\frac{3}{4}$" spruce.

Forward of the cockpit the deck is made from Grade A airplane fabric stretched over a frame work composed of $\frac{3}{8}$"x$\frac{1}{2}$" spruce strips. The beams between the strips should be hollowed away to prevent the fabric touching them which will cause an unfair bump to appear after the fabric is doped. The fabric is treated with airplane dope in the conventional manner after it is stretched taut and fastened.

The bottom planking is made from Philippine or Honduras mahogany $\frac{5}{16}$" thick and 6" wide. It is fastened to the chines keel and stringers with No. 6 brass screws about $\frac{3}{4}$" long which should be spaced no farther than

[*Continued on page* 123]

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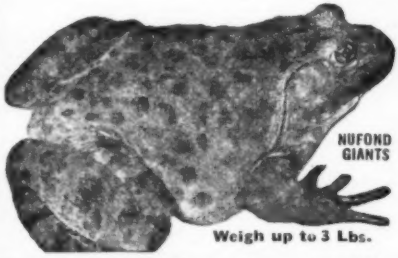

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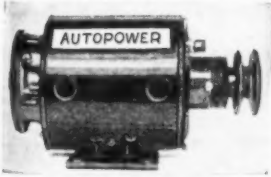

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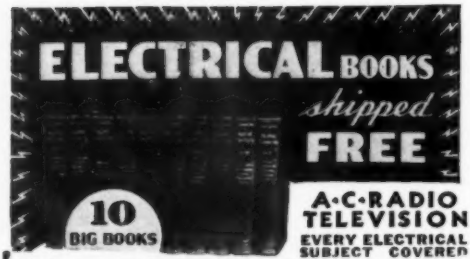

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Camping Without Cooking Utensils

[*Continued from page 79*]

which are giving forth no flame and from which you have fanned the ashes with your hand or hat. As soon as the meat hits the coals, they lose their glow under the meat and become the most excellent charcoal griddle imaginable. When cooked long enough on one side turn them over on other live coals. It is important not to put them back in the same place. When done, it is a surprise to find that no ashes have adhered to the meat.

To make mock duck, roll vegetables in a little flour, then wrap with a steak and cover all with green leaves or wet paper and bury in coals. If civilization hasn't ruined you permanently, instinct will tell you when it is done.

Cooking Rice in Paper Cup

To cook spaghetti or rice make two paper bags by folding hardware wrapping paper, or any other kind of tough paper, somewhat in the shape of an overseas doughboy's cap. Use two or more thicknesses of paper. Soak the spaghetti until soft in one bag, drain off water and grate in cheese. Then fit the other paper cap securely on top of first one, plaster with mud and bake in coals. Rice is cooked the same way, but the cheese is not used. In each case allow plenty of room for expansion, as both spaghetti and rice swell four times their size in cooking.

Here is the way to bake biscuits without pans. Place two logs, from which the bark had been peeled clean, or two boards if they are available, so that one forms a reflector over the other; better explained by saying, two boards with edges placed together to form a right angle in front of the fire. Put the dough, biscuit form, on the lower board or log. It will bake quickly. Another way to make bread is to roll the dough into long strings and wrap them around sticks, which are held over the fire. Get the sticks hot before putting on dough.

How to Prepare Fish

American old timers in many parts of the country smack their lips at memory of planked fish before an old fashioned fireplace. In camp put the cleaned fish on a plank, a log, or hang it on a stick stuck in the ground near the fire. They will bake deliciously.

The mud ball method of cooking also works nicely on fish. They must be drawn first, but do not remove the scales, or skin, before applying the mud.

You can even have bacon and eggs without a frying pan. Use three slices of bacon. With a knife cut one-fourth inch niches about an inch apart through the fat edge of two of the slices so they will bend easily in half-circles and still lay flat. Then lay the circle on the

third slice, after the latter has been placed on a hot stone which has just been removed from the fire. Break the egg so the white runs on the bacon and stone, inside the circle. Then, let the yolk down easily in the same place. To turn the egg and bacon, simply use one end of the horizontal strip of bacon as a handle.

How would you roast an egg in the coals without exploding it? It is an impossible feat if you don't know how. McDonald does it by sharply jerking the egg downward toward the big end. This puts the void in the small end. Then he punches a pin hole in the small end to let out steam and then covers the egg with coals.

Roasting Corn in the Camp Fire

In making coffee without utensils, the old Indian method of throwing in hot stones has been found practical. The coffee and water are put in a bag made by folding heavy paper and the hot stones thrown in. Boiling quickly results. Another wrinkle in coffee making is to dig a hole in the ground just large enough to fit the paper pot. Then throw in the hot stones.

Stews, soups and other liquid viands can be cooked nicely using the stones, the paper bag and a hole in the ground.

The Indian method of cooking roasting ears of corn was simply to bury them in the coals with the husks on and leaving them there for thirty to forty minutes.

Barbecuing Small Game

Pigs usually are too greasy to cook in the mud. The next best way of cooking them is the barbecue. A pit is dug to hold hot coals from a nearby fire. Green poles are placed over the pit and the slaughtered pig, or other animal, is placed on the poles. Keep shoveling more hot coals into the pit, which should be at least a foot deep. Rabbits, quail, almost any kind of wild meat is delicious when barbecued in this manner.

One of the advantages of cooking in the coals is that the camper can prepare his evening meal in the morning, roll it in mud or wet paper, bury it in the coals, cover all entirely with earth, then go hunting, fishing or hiking all day and return at night to find his meal well cooked and savory.

Not every camper knows how to keep warm at night with only one blanket. McDonald explains that its success depends on having a reflector before the fire. This may be made simply by rolling a log near the fire. Then, lay the blanket partly on the ground and partly on the log. The camper sleeps comfortably on the blanket between the log and fire. Covering is unnecessary.

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Packing Zip Into Modern Golf Ball

[*Continued from page 71*]

solve the problem. The feather center was soon outmoded. The solid ball faulted in the shock on the player's wrists. Next came the liquid center, which achieved instant popularity until the manufacturer discovered his water ball behaved erratically in flight.

Dry Ice Used As Core

Today the liquid center has been abandoned. Both soft and solid centers are used. One manufacturer packs his centers in dry ice so that when the carbon dioxide generated by the dry ice expands, the ball is pumped up with compressed power, insuring longer drives.

This soft plastic rubber ball can easily be crushed flat by finger pressure. Before being wound, the center is frozen solid under a temperature of 114 degrees below zero. In play, the center has relaxed, relieving the player's wrists and still retaining most of the tension of the winding. Another manufacturer uses honey as a center.

A lot of things can go wrong with a golf ball in the making. Too much rubber makes it soar too high and drop too straight for a good run. Too thin a cover makes a fine ball off the putting green; too muffled a ball is good on the green but not so good in flight.

A smooth ball hooks; too well-marked, it slices.

How to Test Golf Balls

A good ball regains its roundness quickly after the club impact, then proceeds to go about its business of getting to the place you want it to go.

Here are some simple tests to determine the quality of various parts of your golf ball:

Unwind the rubber from the core. If the thread hangs straight, the rubber is of good quality. Twisted and tangled tape indicates poor rubber.

Mark an inch strand of tape on the ball with a pen, unwind it and see how much farther you can stretch the measured section. That's for tension.

Cut open a ball and test adhesion of the cover to the core. A loose cover will crack open in play.

For roundness, adjust the ball in a small vise until the sides of the ball just touch the jaws of the vise. A perfect sphere should pass through the vise regardless of the position in which the ball is dropped into the vise.

To test balance, drop the ball into a dense solution of calcium chloride of mercury. Mark the spot that floats uppermost. The same spot should not always appear.

Another method is to start a ball several times down a slight incline to a level surface. An ill-balanced ball will not roll straight.

Build "Pep" — A Class "C" Racer

[*Continued from page* 118]

three inches between centers. A strip of linen or cotton should be laid along the seam before the planking is applied and the plank laid down on wet white lead. Allow about $\frac{1}{32}$-inch crack between the planks and roll a thin strand of lampwick packing in the seam after it is finished. The planking on the squat board aft of the transom is the same as for the bottom with the exception that it is not watertight. The seams in this portion should be left open and should appear as a slot about one-half inch wide. This part of the boat is not needed for flotation and only prevents the hull raring up when a puff of wind gets under the bow at the same time she jumps a wave.

Stuffed Bumper Used on Racer

The bumper fairs out the curvature at the bow, streamlining it after a fashion, and is constructed from rawhide or waterproof canvas of about 12 oz. weight. It is stuffed with raw kapok or, if the builder wishes, with curled horsehair. Sheets of sponge rubber laid in layers and cut to shape would be excellent also.

The coaming is of one-half inch spruce and may be cut to any shape that the builder desires, consistent with good appearance. A dash board of the same material is fitted to the front of the cockpit and its upper edge padded in the same manner as an airplane cockpit.

The breaker strips (Figs. 5 & 9) are of $\frac{1}{16}$" brass and are fitted along the steps and the knuckle. They aid materially in allowing the water to break away from these corners reducing wet surface and thereby reducing friction.

Hardware That Is Needed

The steering wheel and fin are purchased from marine hardware stores handling outboard supplies. Most drivers have their own ideas about these and they may be purchased to suit the fancy of the builder. For those not initiated into the game I would suggest a steering wheel from twelve to fifteen inches in diameter and a fin eighteen inches long and about nine inches deep.

When the hull is ready for the water it is well to start her out at slow speeds working up to the maximum as you become more proficient in the handling of the craft. The little things make perfection in outboard racing and it will be well to experiment with various angles of motor mounting as well as placement of the fin. When you think she is tuned up to perfection put her alongside of another class C boat that is known to be fast. Remember also that a smooth bottom is essential.

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How Sandhogs Tunnel Under Rivers

[*Continued from page* 69]

That is the cutting shield. This steel cylinder forces itself through silt at the speed of twenty feet in forty-eight hours. It moves through rock—after men cut away before it with pneumatic drills—half that distance in the same time.

But before the cutting shield could be placed in position, other things had to be done by Mid-Town Tunnel workers.

Two shafts forty feet wide were dug straight down seventy-five feet into bedrock. One of these shafts was dug on each bank, several hundred yards back from the river's edge.

Surveyors Say "Dig There"

Engineers squinted through their instruments, at two hanging plumbs, at the bottom of this shaft, "painted a head" on the face of solid rock where the tunnel would go off at right angles from the shaft, and said: "Dig there."

Men fell to with pneumatic drills and dynamite. Hoists lifted the cut rock out. When sufficient of the tunnel mouth had been hollowed out, the cutting shield was lowered.

Meanwhile, other work was going on up above. Two monster caissons, each a steel cylinder within a cylinder, and the space between them filled with concrete, were upended on the river bottom a short distance from each shore and directly in the path of the on-coming tunnel. Sandhogs descended into these caissons, fifty-two feet by forty-five and more than a hundred feet high, shoveled out silt and rock until the caissons each penetrated into bedrock, while the other end protruded above the river's surface.

Sandhogs Work Under Pressure

Back to the tunnel itself. A battery of hydraulic jacks, each with a thrust power of 6,000 tons, push the cutting shield ahead. And as the cutting shield progresses, the cast-steel and cast-iron lining of the tunnel is fitted into place behind it. This lining is in the form of giant rings, thirty-one feet in diameter. Each ring is assembled in fourteen curved segments. These rings are two and one-half feet in width, and each is bolted and sealed to its neighbor. The segments of each ring are also fastened by bolts. Compressed air is forced into the tunnel to keep the outside pressure from pushing in silt and water, killing the sandhogs.

The forward movement of the cutting shield is two and a half feet under the drive of the jacks—just enough to fit in another ring.

Once in place, this ring-lining is used as a base against which the powerful jacks act to push the cutting edge ahead.

[*Continued on page* 142]

The World's Most Dangerous Job

[*Continued from page 46*]

caused either by falls of persons or by falling objects. Men ride on loaded cranes. They walk across narrow, partially suspended beams. They lay their tools down on girders, whence they are kicked off to strike some other workman below. Boards and debris are tossed out without warning or clutter up walks and stairways to cause broken bones. Defective chains, rotten ropes, unsafe derricks and ramps, wheelbarrows with hasty "home-made" repairs, tools with split or loose handles and a hundred other serious matters give the construction industry its black eye as one of the three biggest man killers.

Black Damp Danger of Caissons

"The construction industry," says W. Dean Keefer, chief engineer of the National Safety Council, "is twenty years behind the safety movement. Hundreds of boards lie around on every job with projecting nails that are paid for with amputated legs, long periods of enforced idleness, doctors' bills and workmen's compensation. Floor openings are unguarded, ladders rotten, material hoists unsafe. Conditions change from one hour to the next and many supervisors and workers alike seem blind to opportunities for accident prevention."

There's a black damp danger inherent in the construction industry also, encountered by the men who dig the deep wells into which is poured the concrete for the piers on which skyscrapers rest. Sinking these wells, the caisson diggers are often buried by cave-ins of sand or clay. Sometimes an underground stream of water is tapped and brings death by drowning. Sometimes deadly air at the bottom of the narrow treacherous shaft gets another shovel man. And occasionally the "black damp" brings unconsciousness or death.

Unemployment Doubly Dangerous

The revival of industry has brought one reason for rejoicing that may be overlooked. According to the statistics, the man who has a job is twice as sure of getting through the day without being killed as is the unemployed man who has to hang around home from morn to night.

The latest available figures show that in 1933, 14,500 persons were killed accidentally at their regular gainful jobs, while 29,500 met death by accident in their homes. The permanent disability figures show a still wider margin of safety for the working man, with 55,000 casualties reported in occupational work and 130,000 from home accidents. Temporary disabilities reported by employers numbered 1,200,000, while home casualties of

[*Continued on page 143*]

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And the author of that sentence might have added "AND SAVE YOUR JOB AT THE SAME TIME" if he had thought of a machine shop when he wrote it.

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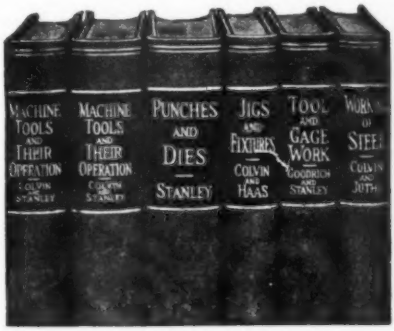

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Tiny Motor Powers Model Plane

[*Continued from page* 91]

the bottom is faired out in the same way that the turtle deck is handled. Both these fairings are made separately and doped on when the fuselage is completed.

The phone jack noted in the drawings is bound and glued to a strut or to the lower longeron. It is required to plug in three dry cells which are used for starting the motor. Once the motor is running a quick jerk removes the plug from the jack and the motor will operate satisfactorily on the two small flashlight batteries carried in the ship.

Flashlight Cells Balance Plane

The flashlight cells are carried in a small box made for the purpose. This box should be made to fit snugly to the inside width of the fuselage. It slides on the balsa flooring shown in the sketches and is held securely in place by means of a small set screw and nut. The purpose of this arrangement is to permit adjusting the position of the battery box to obtain correct balance of the plane. In the next instalment a picture is given of this detail.

The landing gear and axle is made of two pieces of 1/8" piano wire. The landing gear, faired out with balsa as shown in the drawings, is bound to the fuselage with silk thread, doped. Or, it may be attached through aluminum tubes which are previously bound to the fuselage in the same manner. About 7 inches from fuselage to axle centers provides sufficient angle when on the ground and a track width of 15 inches is recommended. The wheels can be turned from pine and equipped with Firestone cigar tray tires such as are sold by department stores or mail order houses.

Tires Made From Beach Balls

Better shock absorbing qualities were found in the airwheels shown in some of the photographs. They were made by turning a spool axle and fitting balloon tires in this manner: Cut out the centers of two beach balls about 6 inches in diameter with valves. The balls can be obtained in 10 cent stores. Tire patching was then worked into the center to form a tire until all was tight again and the "tires" could be blown up. The spindles were then inserted and the tires fully blown up to hide the patching. These tires are extremely satisfactory and provide excellent shock-absorbing qualities. After the fuselage has been fitted with the landing gear, the false formers and the fairing strips for the belly of the ship are put in.

Before covering the fuselage it is necessary to make the stabilizer control gear; the motor mount and attach the cabane struts for the

[*Continued on page* 134]

Do Meteors Hurl Wealth to Earth?

[*Continued from page* 33]

some nickel in its composition. That, indeed, is one of the tests which scientists apply to identify stones from the sky when simpler means of identification leave uncertainty.

A Strange Whirring Sound

Reports from a number of chance observers in 1933 aroused the interest of scientists in a strange and most remarkable sound phenomenon, previously unknown. Among the best of the reports was one from a man named Bruer, an implement dealer in the little town of Crawford, Nebraska.

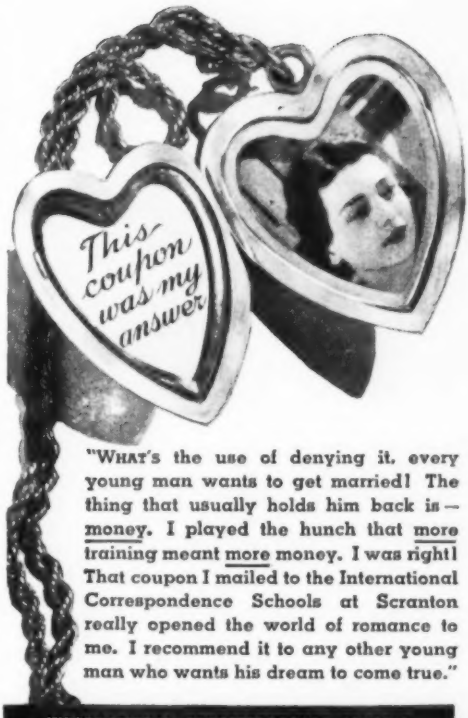
It was just twenty minutes past ten on the morning of August 8, 1933. Mr. Bruer was uncrating a milk separator in his store while talking to a customer. Suddenly he heard a noise which sounded, he said, like an airplane banking. He halted his work and walked toward the open door.

He had hardly reached the door, however, when he saw a sight that made his eyes bulge. The other man quickly joined him to see a huge ball of fire, blazing across the daylight sky. A meteor! Struck speechless by the strangeness of the spectacle, they watched it disappear. It had all happened in a few seconds—the sound, the fireball, silence again. Minutes passed. Then, all at once, another sound startled them—a sound like the rumble of a heavy truck, passing down the street. Again they hurried to the door, but nothing was in sight. There was just one explanation for the second sound, as there had been for the first—the meteor.

Can Sound Outrace Light?

The meteor had been fully one hundred miles away from them when they saw it—that was proved by later investigations. Its light had reached them almost instantaneously, of course, for light travels through space at an almost unthinkable speed; but sound—the sound with which we are familiar—travels slowly through the air, progressing only 1,092 feet per second. Therefore, obviously, they should not have heard the swish and thunder of the fireball until at least eight minutes after it vanished from sight. That second sound had come along on the proper schedule, but the first one—the one that had caused Bruer to go to the door—that must have traveled with the swiftness of light.

This sound—if it really exists—must be independent of air. It would seem to travel, like light and radio waves, through the ether that fills even the airless void of interplanetary space, speeding almost one million times faster than ordinary sound. If that be true, perhaps some day an instrument will be invented which will magnify sounds coming to earth through millions of miles of space.



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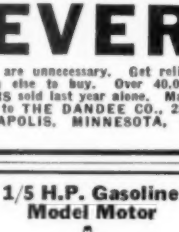

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Spinner and Fly Kinks for Bass

[*Continued from page 77*]

The crude cane pole method of fishing for sunfish, rock bass, croppies, calico bass, and others in the pan fish class has little of value or fascination to it. The more interesting method involves using a fly rod, either bamboo or steel, with a fly reel, light line and fine leader to which the hook is attached. The so-called featherlight or lightweight fly rods, 7 to 7½ feet in length are particularly recommended for this type of fishing.

Quill fishing with the light and short fly rod, consists in using a quill for a bobber. These quills can be bought in any well supplied sporting goods store. They are six to eight inches in length, one-fourth inch in diameter at center and tapering to points. A wire guide, or eye, is located at one end of the quill. A rubber band holds the leader to the quill.

Wade from Shore to Quill Fish

A ten foot length of knotless, invisible gut leader of the so-called raw silk or synthetic variety is used connected to the line. When this is soaked in lukewarm water it becomes limp and very flexible. It is, likewise, very nearly invisible. This combination can be used for still fishing and will be found very effective the slightest nibble being registered on the sensitive quill.

The ideal way to quill fish is to wade into the water around shore and flick out a short line, working the lure here and there with twitches of the rod-tip. By attaching the bare hook to a shaft having a No. 0 or bird's-eye, gold-plated spinner on it you will make your lure that much more attractive.

Use Midget Flies for Sunfish

Sunfish and other pan fish can be taken on small trout flies. The same lightweight fly rod mentioned above can be used. Either wet flies or dry flies are effective in this branch of fishing. The flies, however, must be picked in a small size, with the No. 12 as the largest, and the midge flies, No. 14 and 16 being the best of the lot. There are times when one may take a creel full of sunfish and croppies, also rock-bass and perch, in just no time at all with these minute flies and spinners. It is a far deadlier method of taking the sunfish than the crude worm on the hook method generally used. Remember it is the very small flies that take the fish. Usually the largest of the sunfish fall to these midge flies, the same being just about the size they generally feed upon in the evening.

Use a tapered gut leader for this fishing also, the tip of the leader being very fine for reasons quite obvious. When using wet flies it is possible to handle three flies on the

[*Continued on page 131*]

How to Dive Gracefully

[*Continued from page 50*]

haps the most proficient at this dive. She does it so slowly and so deliberately that the spectator invariably gets the impression that she virtually suspends in mid-air.

Thus far we have discussed only the more graceful dives, which require for the most part balance. We come now to the more spectacular somersaults, where we must become acquainted with the terms "straight," "pike" and "tuck." "Straight," also known as "layout," is, of course, the position wherein the body is straight as, for example, in the straight front header, the first of the basic dives.

The pike position is that assumed at the highest point of ascension in the jack-knife, with the legs straight and the hands touching. In the tuck the knees are drawn tightly against the chest and the arms wrapped around the legs.

Somersaults Require Confidence

The simplest of the somersault dives and the last of the basic dives is the *front somersault*, with the tuck. Complete confidence is necessary to master this head-over-heels dive.

The approach is the same as in the other running dives. Here again, a good spring off the board is necessary to get height. Ascending, reach high as if reaching for a bar. When you reach the top of your height throw down hard with your head, arms and shoulders and pull the knees up into a tuck. Concentrate first on the throw and then the tuck. The throw will take care of the somersault.

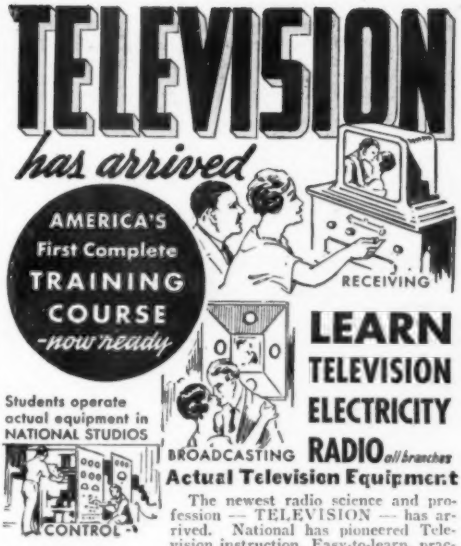
Hold the tuck tightly until you feel that you have made the somersault and you are upright again. Then straighten out of the tuck rapidly but smoothly and descend into the water feet first, legs together, arms stiff at the sides and the head well up.

Timing Is All-Important

An outgrowth of the single somersault is the one and a half somersault. This one is started in exactly the same manner as the single somersault. The throw is all-important here in order to complete the one and one-half circle. Be sure to snap the arms, head and shoulders down sharply before tucking the knees against the chest. To accomplish the one and one-half somersault hold the tuck tightly until you feel that you have spun much too far for a single somersault.

Then straighten sharply and with one movement, shooting the arms and legs outwards. The entry is made as in other front dives.

The full twist is another difficult dive. The take off is similar to that of the swan dive. At the top of the dive turn the head to the left and pull the right arm across the chest. The action of the head will start the momentum and the body will follow in corkscrew fashion.



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Microscope Tells Insect Secrets

[*Continued from page* 65]

a time that these organs were for another purpose than hearing. The construction of the organs, however, points to the fact that they are used to detect sounds.

We know from observation that chirping grasshoppers are very timid, and can detect the approach of anyone, even from a great distance. If these insects can hear the rustling of grass and the crackling of twigs, it is likely that they can hear other man-made sounds, as well as the chirps of companion insects.

Many forms of butterflies possess organs of hearing, even though these insects very rarely produce any sounds themselves other than the clapping of their wings. These ears are situated at the end of the body on both sides, and serve only for the reception of sounds of very high frequency.

Experiments showed that butterflies reacted, with convulsive movements of their bodies, only to the squeaking sounds made by rubbing a cork against glass. Other sounds, such as violin tones, whistled notes, clapping or pounding produced no reaction whatsoever.

Modern Mayflower Carries Pilgrims

[*Continued from page* 29]

an abundant undergrowth of willow and alder. Grass, shrubs and trees now grow on the rich loam soil over a gravel base.

Warm Japanese currents keep the temperature within the ranges of 20 below to 85 above, making winters even warmer than those "back home."

For each settler the government has set aside an allotment of $3,000, which is to be paid back in 30 years with interest at 3 per cent. For this money each family will get a 40-acre farm, a log house with well, and two cows. Food will be drawn from the commissary this year, until potatoes and vegetables, being planted on the 75-acre community farm, are harvested.

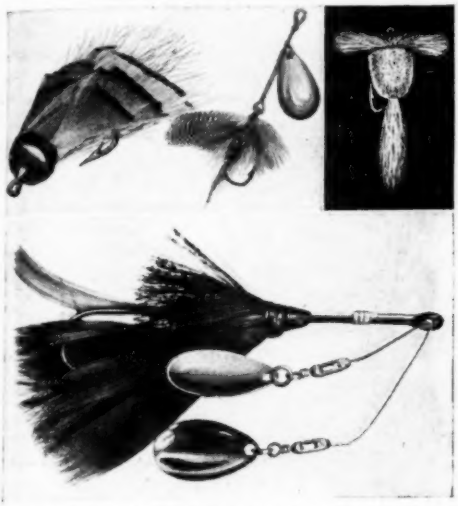
First homes for the colonists were tents —canvas-covered wood frame homes with raised wood floors. CCC workers are cutting logs, erecting log homes chinked with native mosses, then covered with a thin cement of natural mud, on each of the farms.

Dairying will prove most profitable for these twentieth century colonists, according to Colonel O. F. Ohlson, general manager of the Alaskan Railroad. Winter forage is easily grown on the fertile valley soil, and native grasses will furnish summer pasturage.

Other products which can be grown profitably at Matanuska include potatoes and the hardier vegetables.

Spinner and Fly Kinks for Bass

[*Continued from page* 128]



At top left to right are Callmac bass bug, fly and spinner, and the Bug A Boo, popular fly rod baits. Below is Shannon Spinner for both fly and bait rods, an effective bass lure. The spinner shafts also act as weed guards on this popular lure.

leader. When using the dry fly, one is used, even though very small. When using a fly with a spinner on a shaft, one is used. There are times when flies and spinners are the only means of taking pan fish.

Another deadly method of employing the fly rod in taking the pan fish is that of employing bug lures resembling insects such as are seen flitting about the water in the evening at which time this method is at its best. In the evening the fish are inshore picking up the winged ones that drop to water. Caddis flies, mayflies, stoneflies, moths, spinners, etc., make excellent lures to attract the sunfish and others. This method of fishing makes the taking of the panfish on the fly rod equal in interest to that of trout fishing.

Be prepared for action when using lures of this sort for the pan fish. Sooner or later a four or five pound bass will come along to pick up your offering. The sensation of taking a bass no less than six feet from you on a light rod is one you will not soon forget!

A weedless type of bass lure that is very effective has a hook masked in buckhair and feathers with an oval spinner attached to the end of each of two guard wires. These spinners give the lure a glitter and animation that appeals to bass. The all yellow lure in this type is one of the best, especially in late summer and fall fishing. In operating this lure casting is done from a boat into the pads and the lure permitted to sink six or more feet before reeling up.

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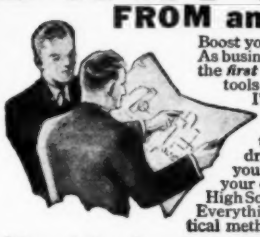

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The 1935 Scrap Gold Rush

[*Continued from page 62*]

too thin to be worth more than a couple of dollars.

If you have any ancient gold trinkets at home and want to sell them, by all means beware of house to house buyers who rarely ever pay full value for the metal. Theodore Wilfred Wright, eminent authority, points out:

All Gold Is Not Pure

"Buyers of old gold know they must buy alloy with the gold. They have no way of separating it, hence they make a flat price per pennyweight. The seller should realize that he may be selling 18 or 14 karat gold with that of a lower karat, and receiving only the price paid for the lower karat.

If you have quite a bit of old gold jewelry on hand and want to sell it either to dealers or the government, here are a few words of advice from Miss O'Reilly, assistant director of the mint:

"First of all, don't transact business with any but authorized dealers. Under a regulation passed a good many months ago, dealers in scrap gold were placed under Federal license. Today there are about 25,000 authorized gold buyers scattered throughout the country.

"Secondly, if you prefer to sell directly to the Treasury Department, please do NOT send even a tiny bit of old gold to Washington. There is no place in the nation's capital where the Government can accept such deposits. Send them instead to the nearest mint or Federal assay office and send them PREPAID.

"If you have the slightest doubt as to the proper procedure, simply write to the officer in charge of the nearest mint or assay office and he will instruct you as to the required form to be filled out. The mints are located at Philadelphia, Denver and San Francisco, and the assay offices at New York City, New Orleans and Seattle.

"Don't send less than an ounce of old gold. If in doubt as to the weight of your jewelry, any licensed dealer will make a weight test."

What Happens To Scrap Gold?

Exactly what happens to this old gold when it is turned in to Uncle Sam's metallurgists? First of all it is weighed to determine the gross weight. Incidentally, there are Federal gold scales so delicate that they can tell precisely how much a pencil mark weighs!

Next the deposit is melted down and assayed to determine the exact proportions of gold, silver and copper. Nearly all old gold trinkets contain some silver and copper.

Payment for the precious metal is made at the rate of $35 an ounce, less nominal carrying charges which average between $1 and $2 for each individual deposit.

How Bridge Cables Are Spun

[*Continued from page* 56]

The strands are built up two wires at a time in mid-air, a loop of wire being carried across for each aerial trip of a spinning wheel or mechanical spider traveling at a speed of about eight miles an hour. A loop of wire for another strand is brought back on the return trip of the wheel, when the tramway is reversed. There are reels of wire at each anchorage.

Spider Wheel Has One-Mile Route

The spinning wheels are fed from reels mounted on mechanically driven unwinding machines. The end of the wire is run down into the anchorage through a succession of sheaves or pulleys, and secured to one of the eyelets which are imbedded in the concrete anchorage. A loop of this wire is thrown around the spinning wheel, and the tramway then started, to carry the wheel up to and over the two main towers, then down to the other anchorage a mile away.

Here workmen remove the loop of wire, place it in clamps, and toss a loop from another reel over the wheel for the return trip. The first loop is cut and threaded through the sheave of an anchorage eyelet, after the slack has been taken out of both wires with block and tackle to give the correct sag. When the two wires have been adjusted to the correct length, they are again held in clamps, extra wire cut off, and the ends fastened together again with a special threaded sleeve.

Wheel May Carry Two Loops

The same procedure is carried out for the spinning wheel on the other side of the endless cable, making possible the construction of four strands at the same time. To speed up the work, two wires can be carried by each wheel.

When the 37 separate strands of a cable have been completed, placed in their permanent saddles, and fastened to the anchorage eyelets, there remains the squeezing of the cable from its rough hexagonal shape into the final rounded shape with a diameter of nearly 29 inches.

The cable-compressing operation is performed with a squeezing jack consisting of six heavy plungers arranged radially, and operated by a compressed air motor. As pressure is applied, the cable is tapped with wood mallets, to jar wires into position.

Before the pressure of the jack is released, wire is wrapped tightly around the cable to hold it in a circular shape. The jack is then moved along the cable to the next compressing position.

The next step, after the cables have been squeezed and fastened with wire bands, is the

[*Continued on page* 134]

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How Bridge Cables Are Spun

[*Continued from page* 133]

placing of the suspender rope saddles. These are clamped over the cable at points 30 feet apart, in much the same manner as split bearings are placed over a shaft.

Each catwalk is now securely lashed to its cable, to permit removal of the four cables which supported it. The 43 miles of heavy steel cable are now cut into carefully measured lengths, and clamps attached to each end. These cables loop over the saddles, and support the roadway below.

The final step in the spinning process is the wrapping of the entire cable with a protective layer of steel wire. This is done with a special wrapping machine powered by an electric motor. Bobbins of wire mounted on a large spur gear feed out wire as they are rotated by the motor and moved along the cable, to lay an even wrapping of galvanized wire. Protective coats of paint are applied to the cable before and after the wrapping operation.

Permanent wire ropes are suspended above the main cables to serve as handrails for the painters who must go over these cables regularly each year. There remains then only the construction of the double-deck roadway to bring to completion an engineering project which was first proposed some sixty-five years ago—a bridge capable of carrying 25,000,000 vehicles and 50,000,000 interurban passengers a year.

Tiny Motor Powers Model Plane

[*Continued from page* 126]

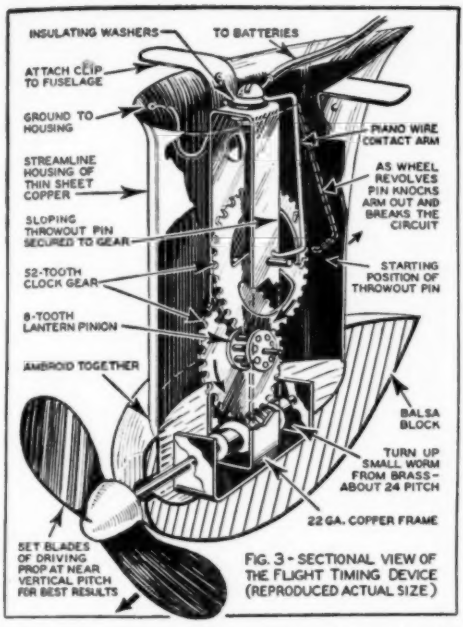
center section. The stabilizer gear is simple and should not be fitted until the stabilizer is built. Construction of the stabilizer will be handled next month.

The motor mount is shown in some detail in Fig. 2. The pine stringers pass through a $\frac{3}{16}$ basswood bulkhead as shown and are anchored to a cross member attached to the vertical struts at station 4. Truss as shown and extend an aluminum firewall from the bulkhead to the motor hood hinge. Lash the motor mount stringers to the struts.

On the upper front portion of this firewall the condenser is strapped. It is connected across the contact gaps on the timer to prevent sparking of the points. The spark coil is mounted as shown in the full size photo of the installation. The ship is always flown with the top motor cowl *off*.

The flight timer, shown in Fig. 3, is essential for a model of this type. Otherwise you are apt to lose your model or at least spend a long time locating it after it flies out of sight.

Two 52-tooth gears from an old alarm clock run against a worm and an 8-tooth lantern pinion. A prong fastened to one of the gears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SLOPING THROWOUT PIN SECURED TO GEAR
STARTING POSITION OF THROWOUT PIN
52-TOOTH CLOCK GEAR
8-TOOTH LANTERN PINION
AMBROID TOGETHER
BALSA BLOCK
TURN UP SMALL WORM FROM BRASS—ABOUT 24 PITCH
22 GA. COPPER FRAME
SET BLADES OF DRIVING PROP AT NEAR VERTICAL PITCH FOR BEST RESULTS

FIG. 3 - SECTIONAL VIEW OF THE FLIGHT TIMING DEVICE (REPRODUCED ACTUAL SIZE)

This timer is an essential feature of the gas-powered model plane. Driving propeller spins in slip-stream and through gearing knocks out spring switch to cut out motor. End of arm fits into hole of gear box post for starting position.

knocks out a spring switch when the allotted running time has been flown. A small clothes pin clipped to one of the blades of the driving prop prevents the timer working until the model is ready to take off. Then the obstruction is removed, the prop spins and after some 258 turns (about three minutes) the prong snaps the spring switch and the motor cuts off. Pitch of the blades governs time of flight --the steeper the pitch the longer the flight and vice versa. Builders can carve out two or three propellers to get variations in duration of flight.

Construction of this model will be completed next month when details of wings, cabane struts, lower wing landing, propeller, and general tuning up for flight will be given.

Write to MODERN MECHANIX AND INVENTIONS MAGAZINE for name of manufacturers selling small gasoline motors and model plane supplies.

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How Bridge Cables Are Spun

[*Continued from page* 133]

placing of the suspender rope saddles. These are clamped over the cable at points 30 feet apart, in much the same manner as split bearings are placed over a shaft.

Each catwalk is now securely lashed to its cable, to permit removal of the four cables which supported it. The 43 miles of heavy steel cable are now cut into carefully measured lengths, and clamps attached to each end. These cables loop over the saddles, and support the roadway below.

The final step in the spinning process is the wrapping of the entire cable with a protective layer of steel wire. This is done with a special wrapping machine powered by an electric motor. Bobbins of wire mounted on a large spur gear feed out wire as they are rotated by the motor and moved along the cable, to lay an even wrapping of galvanized wire. Protective coats of paint are applied to the cable before and after the wrapping operation.

Permanent wire ropes are suspended above the main cables to serve as handrails for the painters who must go over these cables regularly each year. There remains then only the construction of the double-deck roadway to bring to completion an engineering project which was first proposed some sixty-five years ago—a bridge capable of carrying 25,000,000 vehicles and 50,000,000 interurban passengers a year.

Tiny Motor Powers Model Plane

[*Continued from page* 126]

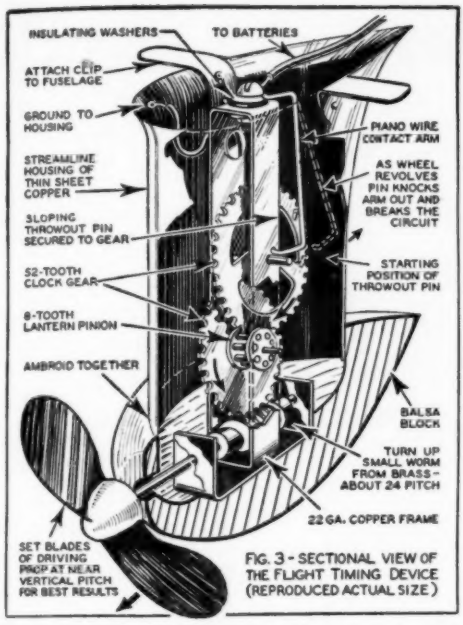
center section. The stabilizer gear is simple and should not be fitted until the stabilizer is built. Construction of the stabilizer will be handled next month.

The motor mount is shown in some detail in Fig. 2. The pine stringers pass through a $\frac{3}{16}$ basswood bulkhead as shown and are anchored to a cross member attached to the vertical struts at station 4. Truss as shown and extend an aluminum firewall from the bulkhead to the motor hood hinge. Lash the motor mount stringers to the struts.

On the upper front portion of this firewall the condenser is strapped. It is connected across the contact gaps on the timer to prevent sparking of the points. The spark coil is mounted as shown in the full size photo of the installation. The ship is always flown with the top motor cowl *off*.

The flight timer, shown in Fig. 3, is essential for a model of this type. Otherwise you are apt to lose your model or at least spend a long time locating it after it flies out of sight.

Two 52-tooth gears from an old alarm clock run against a worm and an 8-tooth lantern pinion. A prong fastened to one of the gears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SLOPING THROWOUT PIN SECURED TO GEAR
STARTING POSITION OF THROWOUT PIN
52-TOOTH CLOCK GEAR
8-TOOTH LANTERN PINION
AMBROID TOGETHER
BALSA BLOCK
TURN UP SMALL WORM FROM BRASS— ABOUT 24 PITCH
22 GA. COPPER FRAME
SET BLADES OF DRIVING PROP AT NEAR VERTICAL PITCH FOR BEST RESULTS

FIG. 3 - SECTIONAL VIEW OF THE FLIGHT TIMING DEVICE (REPRODUCED ACTUAL SIZE.)

This timer is an essential feature of the gas-powered model plane. Driving propeller spins in slip-stream and through gearing knocks out spring switch to cut out motor. End of arm fits into hole of gear box post for starting position.

knocks out a spring switch when the allotted running time has been flown. A small clothes pin clipped to one of the blades of the driving prop prevents the timer working until the model is ready to take off. Then the obstruction is removed, the prop spins and after some 258 turns (about three minutes) the prong snaps the spring switch and the motor cuts off. Pitch of the blades governs time of flight --the steeper the pitch the longer the flight and vice versa. Builders can carve out two or three propellers to get variations in duration of flight.

Construction of this model will be completed next month when details of wings, cabane struts, lower wing landing, propeller, and general tuning up for flight will be given.

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Japanese Make Fortune Raising Pearls

PEARL-CULTIVATION on a large scale is now being carried on in Japan under scientific control after many years of painstaking research. The laboratory manner in which mankind cheats nature to grow these precious beads has developed into a business which has made its owner wealthy.

Because the healthiest oysters are found to produce the best pearls, great care is taken in raising the spawn after it is collected. When old enough, the young oysters are kept in underwater cages of fine wire mesh to protect them from attack by sea enemies.

After three years, the oyster is taken from its bed to the laboratory where it is operated upon. A tiny bead of mother-of-pearl or other irritant is inserted in the heart of the mollusk, then it is returned to its wire cage and sunk below water.

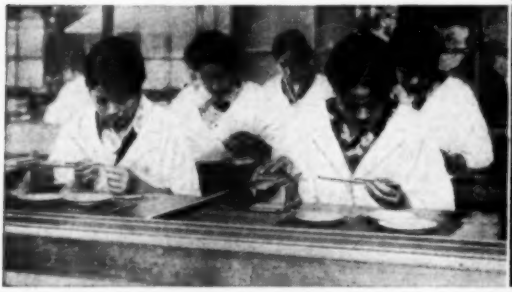
During the next seven years nature goes to work as the oyster deposits a secretion around the irritant. These tiny concentric layers increase in size until such time when the oyster is removed from its bed and opened for the extraction of the "cultured" pearl.

Throughout the period of "planting," the health of these gem-producers is carefully guarded. In nine out of ten cases the industrious oyster will proceed to deposit its mother-of-pearl coating about the tiny core until the cultured pearl matures in size.

There is claimed to be a marked distinction between "cultured" and natural pearls. The general structure is finer in the cultured pearl than in the bead formed accidentally. Examination of the cross-section of a pearl will reveal its type, for a "cultured" specimen always will have a mother-of-pearl core. Because of irregularities in shape and growth, only 5 per cent of cultivated pearls are salable.

Above — Selecting the healthiest oysters for laboratory treatment. Below — Cheating nature by inserting irritant in oyster to form core of cultured pearl.

Below — Planting oysters in wire cages after introducing irritant in shell. Three to seven years are required to produce a fair-sized cultivated pearl.



Left—Final cleaning and weighing. Right—A perfectly formed pearl is shown in a late stage of development before removal from oyster. While ninety per cent of mollusks artificially stimulated produce cultivated pearls, only five per cent are perfectly formed and easily salable. "Cultured" pearls are claimed by experts to have a much finer structure than accidental beads.

Byrd's Adventures in Little America

[*Continued from page* 41]

for the animal to be released at another entrance. Suddenly a Penguin came wobbling out. The result was a scream. You should have seen our valiant expeditioner battling the ferocious beast."

The penguins in the Antarctic are of two general types, the adelié or smaller penguins and the emperors. Some emperors grow to the size of eight-year-old children. Penguins weighing as much as 80 pounds were encountered.

Granite-sloped mountains 20,000 feet high separated Little America from the South Pole. On one trip Peterson experienced one of his most thrilling moments when the big Condor's second motor quit at 16,000 feet while they were heading for the Edsel Ford range. Fortunately, the motor picked up again before a crash occurred.

Found Exposed Coal Deposits

One party exploring more distant territory found coal deposits lying exposed on the surface. The expedition returned to the United States with conclusive proof that the Antarctic has extremely heavy coal beds beneath its deep cap of snow. Another group reported discovery of three volcanoes which were blowing smoke and fire out of snow and ice.

The bitter cold, even in the underground buildings in Little America, made handling cameras difficult. Moisture freezing in some of the instruments made it necessary to keep some of them near a heater until ready for use.

One of the curiosities of travel in the Antarctic was the frequent changes of time necessary while traveling east or west from Little America. Every fifteen minutes the men would change their watches by one hour because of the converging latitudes.

Peterson Made 21 Flights

The cameras were taken on tractor expeditions to supply bases located miles from Little America for the planes on their exploration flights. These trips through blizzards and over dangerous crevasses provided the men with many thrilling adventures. On one occasion Peterson and a group had to dig a tractor out which became lodged in a 35-foot crevasse. They had to build a snow bridge under it and then dig a ramp in the hard-packed snow. The accident nearly cost the expedition one of the six motion picture cameras.

The cameras were taken along on many trips. Peterson made 21 flights with the camera. Herrmann made five. The longest dog team trip by surface was 1,220 miles. One plane flight was approximately that long.

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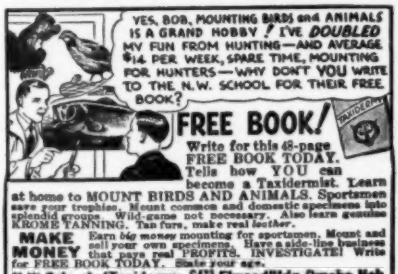
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Inventors Should Try Sports

[*Continued from page* 85]

pressing a button. Such an automatic scoreboard could be either mechanically or electrically operated.

Who can invent a cellar target for rifle practice which will be perfectly illuminated and not cause the bullets to spatter? There should be some way of stopping the bullets or arrest their motion gradually without wearing out any part of the target.

A non-lacing football which can be sealed by an entirely new method is needed. This would make for more accurate kicking and throwing because the heavy lacing used throws a ball out of balance.

The designer of an all-metal archery bow with sights included would make a fortune if the article could be brought to the attention of the thousands of persons who have taken up this sport.

A waterproof safety pocket for bathing suits would be worth a great deal of money. Although the problem has its difficulties, it can be solved and the solution would be worth at least $100,000 in royalties over a period of a few years.

There is $75,000 awaiting the lucky man who invents a punching bag wall bracket which will prevent the vibration from passing into the wall. In short, a means of insulating the wall against the sound is needed.

A more effective method of protecting eye glasses worn by those engaged in sports would be welcomed if made to retail for twenty-five cents or less. Such a gadget should net its inventor $25,000.

Replaceable spikes for shoes would also be a worthwhile invention.

How Sandhogs Tunnel Under Rivers

[*Continued from page* 124]

The forward side of the cutting shield has three levels at which men may work with pneumatic drills or picks to break away rock and shovel it back to the narrow guage railway cars.

But when the going is soft, there are no men in front of the shields. A slush gate is left open in the bottom of the forward end of the cutting shield. Then the jacks are applied and as the shield moves ahead, the muck and ooze is forced back into the bottom of the tunnel. Then it is shoveled into cars—but not all of it.

Always, a certain amount of rock and silt must be kept in the bottom of the tunnel for ballast. Otherwise, the tunnel lining would break loose, float to the top of the river, and the sandhogs would drown.

The cutting shield is forced right on through the base of the caisson sunk a few rods off shore. Thus, the caisson becomes an integral part of the tunnel itself.

The World's Most Dangerous Job

[*Continued from page* 125]

this sort rolled up the tremendous estimated total of 4,230,000.

Financially considered, the 1933 occupational accidents ran up a partial cost of $550,000,000. This was for wages lost, medical expense and overhead cost of insurance, but does not include insurance claims paid, nor cost of property damage caused by the accidents.

Extension of the "safety first" educational movement has made industry vastly more secure than it was a few years ago, a story impressively told in that fact that just one man lost his life in the vast job of constructing A Century of Progress Exposition at Chicago. He was struck by a steel girder which got out of control in a high wind during erection of one of the Sky Ride towers. In 1893, on the other hand, scores of men suffered death during the building of Chicago's Columbian Exposition.

One Death To Every 100 Men

And yet, efficient as the safety work is, death and injury are still inevitable in industrial occupations and somebody has to take it. In every machine shop employing 100 men there will be one death every twenty years and one major permanent disability every fifteen years. A cement mill employing 1,000 persons will normally experience six deaths and four major injury cases every five years. For every $1,000,000 of payroll represented in iron erection jobs the fatality rate is 4.5 men. It is on such facts that insurance rates are based.

Men between 20 to 29 years of age seem to be injured most frequently, although the 30-39 age group is almost as bad off. Deaths and permanent total disability follow most often the injuries to the 30-39 age group. Only five per cent of men victims of occupational accidents, are under twenty years.

Hand Injuries Most Frequent

Injuries to hands and fingers are most frequent, with legs and feet ranking second and arms third. Injuries to head, face and neck rank fourth in frequency and eye injuries fifth. These statements are based on New York statistics and probably approximate what can be expected elsewhere.

Grim as the figures are, however, it should not be felt that in entering upon industrial life it is equivalent to receiving a death or disability warrant. According to the insurance folks, the industrial worker at the age of twenty has a life expectancy of forty-two more years ahead of him. And that's time enough to get a lot of good work done.

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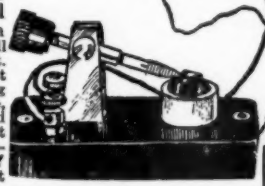

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Into a trunk, under the bed or anywhere. Lots of fun fooling teacher, policeman or friends.

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a little instrument, fits in the mouth out of sight, used with above for Bird Calls, etc. Anyone can use it. **Never fails. A 64-page Book on Ventriloquism and the Ventrilo. ALL FOR 10c POSTPAID.**

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DON'T BE BULLIED. Learn to protect yourself under any circumstances without any weapons whatsoever. Jiu-Jitsu has been proved to be the BEST science of self-defence ever invented. Jiu-Jitsu, meaning "muscle-breaking," is the Japanese method of physical training, and has been practised for three thousand years. It has long been acknowledged as the most wonderful of all systems, giving power over an adversary that counts for more than strength. Anyone well trained in Jiu-Jitsu can meet and defeat the fittle expert at all points. This book gives the fullest instructions enabling you to learn Jiu-Jitsu in the privacy of your own home. Fully illustrated. **PRICE 25c Postpaid.**

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THE ART OF DANCING

Learn the Carlo, Continental, Rhumba, Kiss Dance, Etc.

LEARN TO DANCE THE LATEST STEPS. Be popular this season. Really good dancers are always admired—always popular guests. Partners welcome them eagerly. With the aid of this book you can learn the newest, smartest steps without a teacher and become a dancer who is sought after. After following the instructions in this new book you won't need to make excuses when the dance music starts. Besides you'll get lots more fun out of parties and dances. If you want to become a perfect dancer, learn to dance at home this new, easy way.

WHAT THE BOOK TELLS: How to develop poise and control, how to improve your dance steps, the art of holding, how to walk to music, how to lead, how to do the latest Fox Trot Steps, Natural and Reverse Turns, the Reverse Wave and Change of Direction Steps, the Quickstep, swaying to music, how to waltz, Backward Changes, how to do the Continental, the famous Kiss dance, the Manhattan Dance, the College Rhumba, the Carlo, the Veyo, etc., etc. Nearly 100 illustrations are given, and everything is made so plain that you'll be dancing before you know it. **PRICE 25c POSTPAID.**

Learn to be a Tap Dancer

Why envy the easy rhythm and fascinating grace of Step'n Fetchit, Fred Astaire and others? Now you can learn to tap dance in ONLY 6 HOURS by a new, simplified course of lessons by Prof. Hawley Wilson. No special ability needed.

Be smart! Learn tap dancing. Everybody's tapping. The whole town is tapping. Learn to beat out a tune with your feet. Hostesses love it. Friends adore it. It's fun and you'll thoroughly enjoy the lessons. Besides, tap dancing is not only an invigorating and entertaining accomplishment, but it is also an ideal and health-giving exercise for making the limbs supple and giving a "springy" feeling of fitness to the whole body. It promotes slimness—nature's way, without pills, drugs or dieting. Here is what some of our readers say: "... wonderful benefit. Thank you for adding tap dancing to my accomplishments." And another: "My friends were amazed. I dare not recommend your course for fear of competition." **PRICE 25 cents.**

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Boy Electrician with 75 illustrations for making Batteries, Dynamos, Motors, Telegraph apparatus, Telephone, Lights, Bells, Alarms, Coils, "Wireless" Current Reverser, Electric Engine, Radio, etc. **Price 10c Postpaid.**

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Business Changes Its Ideas

All things yield to change. Even business cannot escape the bombardment of new ideas. Here are a few new products which are invading the field today.

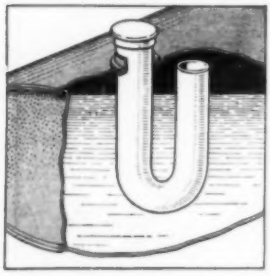
Improved steering is featured on the latest type of streamlined coaster wagon. The handle cannot catch on wagon box and upset the rider. A metal link projects through semi-circular slot in body to connect handle to wheel. Headlights are recessed and even wheels have mudguards.

A new micro-projector for classroom use permits throwing image on screen for further analysis of subject matter. Device fits any microscope.

Tarnish-proof picture frame mouldings, resembling costly solid silver frames, are now produced by processing aluminum-covered wood.

Vanishing cream for mechanics is now being marketed. When rubbed on the hands, the cream forms an invisible "glove" to protect the skin from dirt, paint and grease.

A metal guard, attached to the beak of barnyard fowls, prevents fowl-fighting which ultimately reduces egg production. The shield does not interfere with eating, drinking or natural habits.



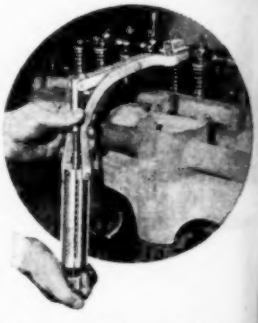
U-shaped metal tube installed in gas tank of auto prevents thief from siphoning out contents. Cap is renewed for filling. Unit must be built into the tank at factory.

An electric lantern with a swinging handle, resembling the type used by railroad men, is available for home, camp or general use. Red and green signal globes, in addition to white, fit the lantern. Flashlight cells are used.

Protective coatings of rubber can now be applied in liquid form to prevent rust in metal parts and protect painted surfaces of materials until ready for use. The coating pulls off easily. Rubber-coated auto bodies can thus be protected while on the final assembly line.

Flashlights for the outdoorsman are offered in two different styles. One type is equipped with a compass at one end, while another type carries a red signaling lens fitted in the end cap to warn motorists while hiking. Both lights have belt clips.

Color-matching is now scientifically possible with a new device which contains a photo-electric cell. Comparison on the meter scale of two colored objects indicates degree of difference in corresponding shades.



Valve spring tension can be tested without removing valves from motor. The exact amount of pressure in the spring is indicated in pounds on scale in handle.

Windshield wiping accessory contains water or anti-freeze which flows through tube and drips directly in path of wiper, for clear vision in all types of weather.

A new combination child's toy may be used as a self-winding top or a musical spinner.

A multiple antenna system for the radio store, apartment house or home is claimed to be well suited for use with all wave receivers.

Carbon resistors for radio sets are now being made in values as low as .04 ohms. These units are not affected by heat or excessive humidity, and carry up to 10 watts.

Note—Addresses of manufacturers of new products in this issue are available through Modern Mechanix and Inventions Magazine. *Send stamped, addressed reply envelope. Manufacturers are invited to submit photos and stories of new products for this page.*